The EFFECT OF USING UNIVERSAL DESIGN FOR LEARNING TO IMPROVE THE VOCATIONAL PROGRAMME WITH INTELLECTUAL DISABILITIES AND THE CHALLENGES FACING THIS METHOD

OHUD ADNAN SAFFAR

School of Education
University of Strathclyde, Glasgow

A thesis submitted in partial fulfilment of the requirement
For the degree of Doctor of Philosophy, 2019

DECLARATION OF AUTHENTICITY AND AUTHOR RIGHTS

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination that has led to the award of a degree.

The copyright of this thesis belongs to the author under the terms of the United Kingdom Copyrights Acts as qualified by the University of Strathclyde Regulation 3.50. Due acknowledgement must always be made of the use of any material contained in, or derived from, this thesis.

Signed :  **……**

(OHUD A. SAFFAR)

Date : ……19 March 2019……

PRESENTATIONS AND PUBLICATIONS RELATED TO THIS WORK

Saffar, O. (2018, May, 15). *The Effect of Using Universal Design for Learning (UDL) to Improve the Quality of Vocational Programme with Intellectual Disabilities and the Challenges Facing This Method from the Point of View*. Oral presentation. Conference proceedings of the ICSENTDA 2018: 20th International Conference on Special Educational Needs, Teaching and Different Approaches. London, United Kingdom during May 14-15, 2018. Publication in the special journal issues at http://waset.org/Publication

Saffar, O. (2017, Nov, 25). *To inclusion: using universal design for learning (UDL) to improve the quality of Vocational programme*. Poster presented at "the 16th annual School of Education Doctoral Research Conference". The University of Birmingham on 25th Nov, 2017.

ACKNOWLEDGEMENTS

I would like to thank God for providing me the energy, patience and determination to complete my research and write this dissertation.

Mom and Dad, you are the most precious things in my life. Thank you with all my heart for your support and your prayers for me. Great thanks my parents, I respect your tears because I am far away from my family. I have achieved the dream of my father and mother to become Dr Ohud and to serve children with special needs.

All thanks and gratitude to my wonderful supervisors, Dr. Vivienne Smith and Dr. Helen Marwick, from whom I learned a lot (including diligence, accuracy, clarity, honesty in work, professionalism, scientific research and planning for the future). I am fortunate to have supervisors like Dr. Vivienne and Dr. Helen; they will be role models for me. I would like to thank them for their humanitarianism and the academic advice they offered me.

I also would like to thank and dedicate my efforts to the source of my ideas and inspiration; Nora, the daughter of my aunt, who suffers from Down syndrome. Likewise, many thanks to my role model and my aunt, Dr. Ramzi Saffar, for her support of me and my sister's illness.

My greatest appreciation goes to my beloved brothers and sweetheart sisters (Wafa, Rash, Abrar) for their constant prayers, support and encouragement. Especially my lovely sister, Roaa, who suffers from cancer. Despite her illness, she encouraged me and gave me the energy to complete my work. I give thanks also to my companion and my brother Mohammed Saffar for your support in the UK and to my brother Fahad Saffar for your support from outside the UK.

My deepest gratitude to my darling husband, Suojaa, who stood beside me in the most difficult times and bought happiness into my life.

I would like to extend many thanks to my friends in the UK and in Saudi Arabia. In particular, I thank my colleagues for supporting me in my difficult days, Omar Al Awajee, Naima Al Hassan, Nadia Al Farhan, Reem Alghatany and Hind Al-Shalawi mother. Also, I would like to thank Dr Majed Al-Salem for his efforts to present a workshop on UDL. Moreover, I would like to thank all School of Education staff and students for their help and the pleasant discussion during school and doctoral seminars.

Finally, thanks also goes to the government of Saudi Arabia for funding my study.

Dedication

To my parents, who gave me love and tenderness,

To my husband, who is the secret of my strength,

To my brothers and sisters, who are the cause of my happiness in life,

To my lovely sister, Roaa Saffar, who has passed away; I hope to meet her in heaven,

To students of special education needs,

ABSTRACT

The purpose of this study was to investigate the effect of using universal design for learning (UDL) on the acquisition of photography profession skills in a vocational programme for students with intellectual disability (SID) in the Kingdom of Saudi Arabia (KSA). The study has also sought to discover the effectiveness of this method for integrating the SID with students of non-special educational needs (SNSEN) (or non-SEN) in the same classroom. Moreover, this study has explored the advantages, drawbacks and the challenges associated with the implementation of the UDL method in the classroom from the teachers' perspective. That this study took place in girls' secondary schools in mixed ability classrooms. that 24 numbers of students and 16 teachers took part, that data was collected by questionnaire, lists of observations, open questions, and pre- and post-testing.

The first stage was to investigate the teachers' opinions by using the questionnaire and open questions, after training the teachers in how to apply the UDL, to teach SNSEN and SID in the same classroom. This stage also sought to learn the effects of UDL on integrating the SID with SNSEN students. The second stage explored the effect of the UDL on the teaching of professional photography skills for the SID in KSA. To achieve this goal the observation lists and pre- and post-tests were used to compare the learning performance of the SID which used the UDL in experiment groups, with the performance of the SID that used the usual, traditional strategies of learning in control groups.

The results of the research were analysed using a Mann-Whitney U Test, as well as various descriptive statistics. The findings indicate that there was a statistically significant difference between the control and experimental groups in the pre- and post-tests, where the students who used UDL to learn photography developed more quickly than those in the control group. As well as this, the opinions of teachers confirmed that the use of UDL is beneficial in helping with the inclusion of the SID and SNSEN in the same classroom. The findings further revealed the teachers' opinions on the advantages, drawbacks and obstacles to the application of UDL. The study has significantly added to our understanding of the contribution that UDL can make in developing professional skills for SID. The findings advance the current literature in the area of special education needs, particularly in respect of promoting the inclusion of students of intellectual disability within the same classroom as their non-SEN peers.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

SID	Students of Intellectual Disability
SNSEN/non-SEN	Students of Non-Special Education Needs
SEN	Special Education Needs
UDL	Universal design for learning
KSA	Kingdom of Saudi Arabia
US	The United States
UK	The United Kingdom
IQ	Intelligence quotient
MoE	Ministry of Education

1 CHAPTER ONE: INTRODUCTION

The KSA seeks to improve the quality of education and outcomes for both SEN and non-SEN students. With this in mind, it has published Vision 2030, which seeks to foster education development, particularly in the area of special education. Published on April 25, 2016, it aims to improve many things, including: resources and diversification of income, services and infrastructure, support systems, the national economy and domestic growth, national industries, health, societal welfare, sustainable development, development in research and innovation, developing qualified human resources, and meeting labour market requirements. Moreover, Vision 2030 also seeks to solve problems facing the education sector. Examples of educational problems in Saudi Arabia include: some students receiving poor education services and programmes, a weak educational environment, hindrance in innovation and creativity, a lack of personal and critical thinking skills, and a negative stereotyping of the educational profession. Also, the education sector suffers from falling curriculum quality, a dependence on classical methodologies, a lack of teacher assessment skills, a lack of compatibility in educational and training outputs with labour market requirements, a lack of investment in private education, and an absence of support services (Ministry of Education, 2019).

One of the most important challenges facing education is making sure that educational strategies and curricula are more suitable to those with special education needs (SEN) and non-special education needs (SNSEN). Problems associated with educational independence and student self-reliance after graduation is one of the issues that the Kingdom of Saudi Arabia (KSA) is looking to solve. Therefore, this study will focus on solving these problems and trying to achieve the goals of Vision 2030.

In order to achieve the objectives of Vision 2030, specialists need to discover modern methods and strategies that help students with SEN to learn academic and professional skills that help them integrate and develop their autonomy. These strategies need to cater to the individual needs of each student and facilitate the inclusion of SEN and SNSEN in the same classroom. In addition, it is necessary to know the obstacles and problems that arise from the use of educational strategies when teaching SEN. This is so that teachers and decision-makers can reform the educational system to align with the teaching quality standards embodied in the KSA's Vision 2030 educational reform. Therefore, this study explores how

contemporary western pedagogy integrates with the educational system and how that system is undergoing one of the most important political changes in Saudi Arabia's history.

At the beginning of this chapter, the terms ‘students with intellectual disabilities’ (SID) and ‘students with non-special educational needs’ (SNSEN or non-SEN) will be defined and explained. The discussion in this chapter will focus on the background to the Saudi education system and SID students in mainstream schools. The goal here is to learn more about the characteristics of these particular classes, so that we can fulfil the aims in this study. The discussion will also focus on the prevalent social culture surrounding education, legislation governing special education, the definition of SID and non-SEN, vocational rehabilitation and the teachers of SEN in Saudi Arabia. The aim is to identify the social and academic problems faced by SID students in mainstream inclusion classes and to seek to solve these problems. Then, the meaning of Universal Design for Learning (UDL) and inclusion will explained and in respect of inclusion. After this discussion, the focus will turn to the rationale and justification behind the study and the significance of its findings. After that, the research objectives and questions underpinning the study will be discussed. Finally, this chapter will define the structure of the thesis as a whole.

1.1 Definition of key terms

Universal design for learning (UDL): UDL is a set of principles that allow each person to learn on a level playing field. It provides a blueprint for establishing instructional methods, aims, materials and evaluations, which do not work for every individual, but rather as an approach that adapts flexibly according to individual requirements (Hall, Meyer and Rose, 2012).

Vocational programme / rehabilitation: The Vocational Rehabilitation system helps to provide assistance to people with special education needs (SEN) in their seeking employment. Through providing a range of services and support, it is delivered by rehabilitation professionals, for example assessment, counselling, guidance, job placement, post-employment support, and postsecondary educational support (Kiernan, Gilmore and Butterworth, 1997). SEN may use this system to obtain postsecondary education services in order to reach an employment goal, but it will not necessarily provide full tuition costs for an individual to attend college. Vocational Rehabilitation requires financial support and funds may be used towards a student's tuition, housing, food, transportation and assistive devices (Kiernan, Gilmore and Butterworth, 1997).

Students of intellectual disability (SID): Intellectual Disability, a condition that involves a number of noticeable deficiencies in the individual's existing functional performance, as described in the Arab Saudi Special Education Institutions / Programmes Regulations (RSEIP) policy document (2002). The condition is characterised by a clearly less than average intellectual performance, combined with shortcomings in two or more areas, such as: communication, self-help, home life, social abilities, self-management, health and safety, academia, and professional qualifications. Before the age of 18, intellectual disabilities appear. Intellectual disabilities are classified into three categories, based upon a student's IQ. For example, the IQ scores for a mild intellectual disability range from 55 and 75; the score for a moderate intellectual disability ranges from 40 and 54; and finally, a severe intellectual disability is present when the score is less than 40 (Ministry of Education (MeE), 2002; Al-Kahtani, 2015). In this study, the focus is on mild SID students who are aged between 15 and 17 years old.

Challenges: These are obstacles faced in the application of the UDL programme in mainstream schools. UDL has only recently been applied in KSA.

The point of view of teachers' perceptions: Taking the views of teachers of special education who are studying SID at the secondary level and understanding how they teach students professional skills.

1.2 Background to the study

1.2.1 The education system in KSA

In KSA, the educational system may have helped the researchers to develop the learning process, through financial support and in providing a suitable environment for the learners. These encourage researchers to create ideas or use new educational methods, for example: the creation of free public schools, and the provision of educational tools such as books and teaching aids. According to the Ministry of Education of KSA (2018), the educational system in the KSA takes on a number of forms. The first type is a general education system, which is divided into kindergarten, primary, intermediate and secondary education. The second is higher education, taught at universities and colleges (in Bachelors, Masters and PhD courses, for example). The third type involves literacy education for older people. The fourth is special

education, which refers to the education of people with special needs in institutions providing special day education, and rehabilitation centres (Ministry of Education of KSA, 2017). The Ministry of Education of KSA (2018) points out that public education is provided in free public schools and universities. However, there are also private schools and universities that charge fees to those wishing to study in them. This divide between free and fee-paying schools is also seen in special needs education.

The KSA allocates a quarter of its state budget to education. In terms of curriculum development, it seeks to provide teachers with resources, provide support services for people with special needs, develop teacher training and help to create a suitable learning environment for all (Hamed, Zeadh, AlOtaibi and Metwally, 2005); (ALShamare, 2019). The educational services budget in 2018 was $192 billion (Ministry of Education of KSA, 2018). This has led to the creation of rights for students with SEN and SNSEN in KSA and has seen the substantial financial support designed to encourage the use of new technological means and strategies to teach SEN. This huge budget encourages researchers to discover new educational development practices, even if doing so is costly, because the Saudi government supports researchers by sending them abroad, for example to the United Kingdom (UK), the United States (US), Japan, and so on. This information helps to transfer the advanced education strategies which KSA schools lack.

1.2.2 Social culture of education in KSA

Every country in the world has a particular culture that the researcher must take into account. KSA is characterized by its Islamic culture, but opportunities for learning are available to all citizens, whether female, male, Saudi, non-Saudi, or whether or not they have special educational needs. Alasmrai (2016) explains that boys and girls are taught separately in KSA schools. Article 155 emphasises the need to separate girls and boys at various stages of the education process (primary, intermediate, secondary, university). The exception is in kindergarden, where boys and girls are taught by both male and female teachers. The two sexes are separated on religious grounds.

The KSA strives to develop its education provision and is constantly seeking to evolve. Therefore, many ministries, such as the Ministry of Education and Ministry of Health, are interested in sending students to foreign countries, such as the US, the UK, Germany, China, and so on. They do so to learn from the experiences of other countries and transfer them to

the KSA and use them as part of a process of educational reform (ALShamare, 2019). Social factors, customs and traditions affect the education system in KSA, such that the curriculum is closely aligned with the culture prevalent in Saudi society (Alasmrai, 2016). These traditions include the wearing of headscarves for women, male and female segregation in education, love and respect for the country and wearing appropriate attire. Private education is an integral part of the education system in KSA. Understanding the culture surrounding teaching in this country informs the sample selection strategy, which focuses on girls' schools. What is more, understanding the social culture helps us to design more appropriate educational programmes that are culturally appropriate. For example, one might choose pictures of girls wearing hijab and clothes that suit the culture of the country, or use Arabic when designing lessons. The next section will explore special education in KSA.

1.2.3 Special education, in general, in KSA

KSA has a huge number of people with SEN who need a variety of services. Thus, the country faces a huge challenge; 0.87% of the Saudi population is affected by some form of disability (The General Organization for Statistics, 2017). Thus, the Ministry of Education has reformed the education system so that the quality and range of SEN education is improved. This new education system has had beneficial results for the SEN students. Furthermore, SEN students have been provided with a number of social services such as appropriate medical and educational care, and so on, so that they can improve their outcomes (Aldabas, 2015). Battal (2016) indicated the most important category of SEN in KSA consists of students of intellectual disability (SID) whose care is provided in accordance with individual need. For example, a SID student with a mild disability requires a lot of attention and needs to be taught social skills. The second category includes those with visual impairment (which affects 0.1% of the population). In this case, students are taught using braille, which helps them to adapt to their situation. The third category of SEN includes those with physical disabilities, which affects approximately a quarter of the KSA population (Ministry of Education, 2015). Here, individuals are provided with practical care and programmes that will equip them with different skills and teach them how to deal with their conditions. The final category consists of the deaf and those who are hard of hearing. Individuals in this group are taught how to use sign language, social skills, and personal skills. Approximate 0.2% of the population have a hearing impairment (Battal, 2016).

Institutes and mainstream schools have been developed and equipped to cater for those in each of these categories. For example, the "Al-Amal institute" was established in 1964 to cater for students with hearing impairments. According to Battal (2016) and the Ministry of Education (2015), in KSA, 63,257 students receive SEN services every year. What is more, the government has established self-contained classrooms and resource rooms (rooms equipped with tools and teaching aids to which SID students go to for an hour or two a day when they need more academic support), such that 92% are in regular schools, and 8% are in specific disability institutions. The Ministry of Education later implemented three levels of special education provision: elementary school, which spans six years; middle school, which spans three years; and high school, which also lasts three years (Battal, 2016).

Since the beginning, the law has fully supported the education of all citizens, including those with SEN. Vision 2030 aims to focus SEN support (whether medical, educational, social, and so on). According to Mitchell and Alfuraih (2018), the Ministry of Education of KSA has implemented and developed a general education system that will favour both students (especially the SID) and teachers. This education system aims to provide suitable educational, moral and physical support, as well as core skills and values, to all its students. However, the special education system has not always been so well supported.

The catalyst for change was the Vision 2030 agenda, which priorities special educational provision. This vision supports special education provision in a number of ways. The programmes enabled under its guise will equip students with both practical and professional skills, including sewing, photography and marketing. There is a need to focus on improving education for special groups, especially those with intellectual disabilities, due to the high prevalence of this group in Saudi society. There seems to be a good structure for including SEN with non-SEN in KSA schools, and that helps researchers to commence implementing and experimenting with new studies in inclusion classes. Moreover, the research tries to solve problems associated with inclusion, such as the lack of strategies that bring together SEN and non-SEN students. The meaning of inclusion and problems associated with inclusion will be discussed later in this chapter. SEN students also need vocational training to be able to function in an appropriate and independent capacity. That is the basic goal of Vision 2030. Additionally, new teaching strategies will be deployed. The next section will discuss the legislation and policies related to special education in KSA.

1.2.4 Legislation and special education policy in KSA

If the special education system and professional skills being offered to SEN are to be improved, policymakers, educators, parents and professionals need to develop new laws and policies that not only improve access to education but also contribute to positive learning outcomes and the development of professional skills. In order to achieve these goals, the US published the Disability Rights Act in 2006, which was ratified by the European Union and the UK in 2010 (United Nations, 2018). Article 24 guarantees the right of people with SEN to inclusive education; "the importance of accessibility to the physical, social, economic and cultural environment, to health and education and to information and communication, in enabling persons with SEN to fully enjoy all human rights and fundamental freedoms" (CSIE, 2018b, p. 1). Moreover, it states that SEN should be free from discrimination and be given equal opportunities (UNEDITED, 2015). For example, people with SEN should not be excluded from general education because they have a disability, and they should not be excluded from free primary and secondary education. Also, they should be provided with accommodation (United Nations, 2018). Besides, SEN students should be able to learn life and social development skills so that they can participate as an equal member of society (CSIE, 2018). By providing them with the means of communication, new strategies and appropriate educational aids can support their integration into the community. It can also help them to access higher education and vocational training, free from discrimination (UNEDITED, 2015).

Saudi Arabia has embraced international laws and legislation designed to protect the rights of the disabled. There are a number of rights that each SEN student enjoys. First, each person with a SEN in the KSA should have the right to free rehabilitation and benefit from special education services (Aldabas, 2015; Ministry of Education, 2018). Successful learning for SEN students relies on multiple factors, such as school facilities, professionally trained teachers, support resources, and government funding. Children with special needs have just as much right to education as their non-disabled counterparts. Furthermore, education for SEN students improves their quality of life because it fosters behavioural and emotional development (Aldabas, 2015). Second, SEN students should be involved in part-time special education services within the school. Part-time special education services involve including SEN in special classes attached to regular schools so that they can integrate with their non-SEN peers. Part-time special education supplements the standard curriculum for SEN students and significantly improves learning outcomes. These students often have unique

needs that may not be met through regular schooling hours or in-group settings. Hence, part-time special education provides special contact with the teacher, thus enabling the student to significantly improve within this learning process (Zawacki-Richter, Kondakci, Bedenlier, Alturki, Aldraiweesh and Puplichhuysen, 2015).

Also, they should be treated specially. For example, any special dietary requirements they have should be respected. The government has ensured that these laws are preserved, respected and adhered to by creating awareness around them. Due to KSA's Vision 2030, changes are afoot in terms of how people with SEN are treated within the broader education spectrum. Education reforms in Saudi Arabia through Vision 2030 aim to overhaul a barely effective traditional education system and replace it with a modern and efficient one (Alnahdi, Saloviita and Elhadi, 2019). Finally, non-SEN people are now able to celebrate their differences to those with SEN. This enhances and supports social inclusion by eliminating discrimination and judgement. But also while, in most cases, people apply the actual laws, their normal behaviour in fact already portrays sympathy with the SEN. Because Islamic teachings urge compassion, people are sympathetic to the needs of those with SEN. These religious teachings are the main driving force behind donations for special education (Al-Aoufi, Al-Zyoud and Shahminan, 2012). Also, social inclusion in Saudi Arabia's standardized national curriculum involves educating all children in mainstream schools. The system, however, involves programmes for students with special needs, hence it allows for the direct interaction of all children in order to prevent discrimination (Alharbi and Madhesh, 2018).

On top of this, the KSA has many policies in place to care for those with SEN. These seek to ensure that services are provided for them and encourage justice and equality. According to Article (26) of KSA policy, the Islamic religion requires the preservation of human rights. Article (27) also mandates that the state guarantees the right to life if citizens are ill or incapacitated by providing them with social security (ALShamare, 2019). Al-Mousa (2010) shows that the KSA has signed international agreements that seek to help protect the rights of SEN. In order to provide services to this group and to raise awareness amongst the community about the importance of respecting those with SEN, the KSA has supported people with special needs by providing them with: a monthly allowance, transportation, support, compensatory services, a driver, and food. It also offers an individualised education plan (IEP) to each SEN, because it is the right of people with SEN to receive an individual education plan that includes a focus on health services, psychotherapy, physiotherapy,

occupational therapy and educational services. Finally, the KSA also supports the Education Act (IDEA), which guarantees students with SEN the right to free education and to be treated like their peers (IDEA, 2017).

Although the KSA has legislation in place that protects the rights of those with SEN, there are problems around its implementation in mainstream schools. For example, the traditional model does not focus on professional expertise for special education teachers. The old model of special education does not meet the requirements for inclusion, making it inappropriate for SEN students. International standards for special education have emphasized the inclusion of SEN students such that they can actively interact with their non-disabled peers in the school system. Having special schools for SEN students away from regular schools goes against inclusion requirements (Alnahdi et al., 2019). In addition, limited professional expertise and lack of training are the main contributing factors affecting academic standards for SEN students in the KSA (Alshahrani, 2014). Efforts towards improving SEN, therefore, need to focus on sponsoring professional training and ensuring schools are well equipped to cater for students with special needs. Expanding policy towards inclusive education will likely make SEN education more effective (Kang and Martin, 2018). These laws and policies should mandate that those with SEN should be provided with transition services, intervention Programmes and special education services.

Based on the research questions of this study and analysis of the above legislation, the issues are about the inclusion, the factors to support or prevent the application of inclusion, the impact of implementing a new strategy as a universal design for learning (UDL) and what the challenges are that face this method when training students in professional skills. Finally, it is clear that the legislation in KSA supports inclusion. It can be seen that the KSA is receptive and seeks to develop special education provision. This encourages researchers to implement new programmes and strategies to support the education of those with SEN. As the current study concentrates on SID, the next section will provide details about the characteristics of these students.

1.3 Intellectual disability as special education needs

1.3.1 Definition of intellectual disability

This study will use the definition of intellectual disability developed by the Saudi Arabian Regulations of Special Education Institutes and Programmes (RSEIP) policy document (2002). The term is described in the document's "Definition of Key Terms".

Mild SID is characterised by slower rates of learning in social, language and motor contexts. SID is only noticed when students begin formal schooling (Westwood, 2009). Terminology in Saudi Arabia tends to be out-dated compared with newer terms used in the UK, so for example it was common to refer to such difficulties as mild mental retardation until 2007, when phrasing was updated to focus on intellectual disabilities, in line with international norms. Both phrases reflect the adoption of US definitions (Alhasan, 2018). For example, mental retardation was defined in the US as below average intellectual functioning with limitations in two or more abilities (academic skills, self-care, social skills, safety, and so on). While the distinction between mild and moderate has been practically lost in common usage (Westwood, 2009), severity was intended to be graded sequentially, as mild, moderate, severe or profound, with each category being related to specific IQ scores; mild SID falls within an IQ range of between 70 and 55 (Westwood, 2009).

Alhasan (2018) indicated that the KSA's definition of SID focuses on low IQ scores. This is important in the classification of SID students, since these would not be thought of as SID or having educational needs in the KSA system unless they resulted from low IQ scores. Mansell (2010) states that the UK uses the term "learning disabilities" instead of the term "intellectual disability". However, this study uses the term "intellectual disabilities", because this study was conducted in the KSA, where, like the rest of the world, this term is dominant (Beirnes-Smith et al., 2006).

Westwood (2009) points out that SID students may not have experienced any problems in daily tasks until they started school. In the US, they may be categorised as SID students because of their IQ scores (Westwood, 2004, cited in Alhasan, 2018). However, this measurement is far less common in the UK, where the definition and categories are more vague. Norwich (2014) illustrates how applying various quantitative measures could dramatically change the number of students classified as having SID. This highlights the risk of over or under-representing students with additional needs. Also, the much more

important point is that such a flexible definition ensures that best practice recommendations for students with SID will be less relevant for teachers (Norwich , 2014). It can be more helpful to create clear data for students so that their educators can learn more about their strengths and needs and which teaching approach is best suited to them (Norwich, 2014). This will thus enable the students to access resources and any timetable approach that schools have prepared for them (Ellis, Tod and Graham-Matheson, 2008).

The UK definition of learning disabilities is "the presence of: a significantly reduced ability to understand new or complex information, to learn new skills (impaired intelligence), with; a reduced ability to cope independently (impaired social functioning); which started before adulthood, with a lasting effect on development" (Department of Health, 2001, p. 14). We can see that, although the UK definition emphasises difficulties to be overcome in a given situation, the definition in Saudi Arabia is medically situated in the SID individual, while, at the same time, emphasising the duty of society to ensure that all those students benefit from education. The meaning of the medical model is that the people with SEN are perceived to have different deficiencies to non-SEN people (Skidmore, 2004), such as psychological, physiological, or anatomical structural or functional abnormalities. Also, these people need medical treatment (Low, 2007).

One of the problems associated with the medical model is that IQ tests provide inaccurate information about the intellectual abilities of SID children (Sicile-Kira, 2011). The structure of most IQ tests means that they demand quick responses and developed motor skills, which SID children often lack, and so which places them at a disadvantage in such tests. Providing education for such children involves improving their communication and motor skills (Ministry of Education, 2002; Sicile-Kira, 2011).

It is important to direct attention to other models of disabilities, as a social model is that where individuals experience disabilities as a result of the discrimination in the social environment in which they live (Marks, 1999). The barriers that society has produced can be structural, environmental or attitudinal (Hardie and Tilly, 2012). Also, the social model understands disability as stemming from society, which does not take impairment into account (Gross, 2002).

There is a difference between the medical model and the social model, for the medical model focuses on a person's disability whilst the social model focuses on the fact that society is the cause of the disability (Rieser, 2012). An example of social causes of disability may be the tasks provided and the means and tools that support learning (Booth and Ainscow, 1998). In

addition, a number of researchers (Dyson, 1997; Gross, 2002; Lindsay, 2003) argue that there is a relationship between inclusive education and the social model, where disability is caused by environmental factors, such as a lack of appropriate classrooms, a lack of financial support and the resulting behaviour of society.

However, there are disadvantages with both models. For example, the medical model does not concentrate on environmental factors, and the social model does not focus on the physical body. This is the reason for the emergence of an interactive model, which incorporates both the medical and social model (Wedll, 1978, cited in Lindsay, 2007).

The interactive model understands disabilities as the "outcome of the interactions between individual and contextual factors – which includes impairment, personality, individual attitudes, environment, policy and culture" (Shakespeare, 2009, p. 187). Researchers are encouraged to use the interactive model to foster inclusion because it uses the medical and social model together when planning educational provision for both SEN and non-SEN (Norwich, 2004). This is because "this model takes into account not only the difficulties that students with SEN have, but also the environmental issues that result in students with SEN having difficulty accessing mainstream schools" (Alhammad, 2017, p. 33).

In conclusion, it can be seen that a UK school has a more powerful incentive to have students be diagnosed, which may even make them different. Consequently, research into mainstreaming in KSA is therefore restricted and it is hard to understand whether special education requirements are met as a matter of routine and without classification. It is pertinent to note that the creation of the General Secretariat for Special Education has heralded a new developmental phase for those who have SEN by ensuring the provision of inclusive education for each student, which gives them the opportunity to learn the skills that they will need in their futures. This is in line with the overall objective of offering primary education that supports the development of skills and ensuring that students can enhance their skills as they grow. This, in turn, will allow them the opportunity to provide for themselves and make a valuable contribution to Saudi society once they leave school.

***Characteristics of minor intellectual disability between the ages of 14 and 16*:** Harris (2006) explains intellectual disability as follows. At the age of 14-16 years, people with intellectual disability display substantially more problematic behaviour than their non-special education needs peers. Also, it is likely that students with intellectual disabilities will have difficulty accessing the same opportunities as those provided to people with non-disabilities. The

reason is a lack of IQ and low adaptive behaviour, which refers to a person's "failure to meet developmental and socio-cultural standards for personal independence and social responsibility" (American Psychiatric Association, 2013, p. 33).

Young people with intellectual difficulties have less developed behavioural and emotional capacities as compared to their non-SEN peers. They consequently encounter more challenges in their transition phases, hence the need for more significant support during such periods (Hebbeler and Spiker, 2016). These reduced capacities negatively affect the transition to adulthood. These problems persist through their lifetime, causing challenges in other transition phases (Dykens, Shah, Davis, Baker, Fife and Fitzpatrick, 2015). They may experience some behavioural and emotional disorders which could interfere with their progress. When they discover that they are behind their peers they may become withdrawn, frustrated and act in an inappropriate manner to gain the attention of their peers and adults (Harris, 2006). Intellectually disabled adolescents portray more sensitivity to adverse events or changes within their environment (Dykens et al., 2015). Since intellectually disabled adolescents have problems expressing themselves, they misbehave to draw the attention of their peers. Furthermore, the unfamiliar changes inherent in adolescents are draining for special needs individuals, causing confusion and frustration (Dykens et al., 2015).

Young people with minor intellectual disabilities may also fall into depression but may lack adequate language skills to express how they are feeling. This lack of language may make them express themselves in other ways, for example through changes in diet, behaviour and sleeping habits. Transition to adulthood exposes individuals to extra demands and expectations that require them to manoeuvre through language and emotional demands. Failure to express themselves through these situations results in intellectually disabled individuals seeking alternatives to draw attention. Thus, failure to meet this need qualifies as an intellectual disability as opposed to a mild form of disability. Such challenges result in frustrations and sometimes depressive symptoms in individuals (Munir, 2016). Coping mechanisms for depressed adolescents include excessive or lack of sleep or changes in eating habits (Fridh, Köhler, Modén, Lindström and Rosvall, 2018). Compounded frustration over time, mainly due to lack of support during the period of transition causes hopelessness and in effect, depression. As such, support is critical during this confusing time for the special needs adolescent. Students with a minor intellectual disability may face significant difficulties in terms of their academic skills (Alhasan, 2018). Therefore, they have a possibility of being

left behind in learning and in language skills. This delay in language skills also affects their academic achievements negatively. In addition, their cognitive development is delayed. They learn at a slower pace as compared to their non-special education needs peers. They display deficits in cognitive skills such as memory, attention span and generalization ability. These deficits contribute to their slow learning (Alhammad, 2017).

Thus, knowledge about the characteristics of SID students helps the researcher in the current study to design educational Programmes that suit students' abilities. Thus, memory impairment, language and speech impairment, and difficulties with cognition and movement can be taken into account. Also, this information helps the current study to deal with this category. This study concentrates on mild SID students because these students are the only category of SEN students that can study in mainstream schools in KSA (moderate and severe SID students' study in special schools).

1.3.2 Definition of students with non-special education needs (SNSEN)

SNSEN between the ages of 14 and 16 are learners who have no identifiable learning difficulties associated with recognisable or underlying individual disability. These students exhibit normal behavioural patterns and educational outcomes, ranging from excellent to below average, depending on the subject and level of involvement of the student in learning. In this way, their educational outcomes cannot be distinguished from learners with disabilities if the latter can be accorded a favourable environment for studying and given the required resources to assist them to attain their desired educational outcomes (Newman et al., 2011). It is this factor that makes inclusive learning essential. Inclusive learning means providing everyone with an equal opportunity, regardless of their abilities or disability in an environment that enhances positive learning outcomes. This system offers the benefit of learning for SEN students in an environment that allows them to express their emotions and behaviour in a realistic manner (Al-Zoubi and Bani, 2016). Through the added benefit of trained teachers, the special needs students can develop emotionally and enhance positive behaviour while also benefitting from the academic aspect of their education (Al-Zoubi and Bani, 2016).

***Characteristics of SNSEN between the ages of 14 and 16*:** McNeely (2010) argues that SNSEN and SEN between the ages of 14 and 16 years are going through physical and emotional

changes. They may develop an attitude of testing limits and are emotionally vulnerable, dread negative response and have mood swings. They also care a lot about their physical appearance, are self-conscious of their physical growth and experience changes in their dietary habits. Students at this age care about other people's opinion of them and how they are viewed by society. They also experience peer pressure and feel that they need to dress and act in a certain way in order to fit in. Such learners have a way of influencing each other and question rules set by their parents or guardians (McNeely, 2010). Students are also growing emotionally and begin to become more interested in dating. Teenagers in Saudi Arabia go through the same stages as those in any other country. However, Saudi Arabia's culture is influenced by Islam (Al-Sadan, 2000). Therefore, we find that the Islamic religion affects education, for example: students in schools there are separated according to their sex (Ministry of Education, 2008). They also like receiving praise and being recognised, and can feel easily hurt. This is because they are at the stage of transitioning from children to adults. They may also be emotionally unstable and lack confidence. They are also inclined to view the world in an objective manner. Girls tend to mature earlier than boys (McNeely, 2010).

In inclusion schools, it is important to learn about the characteristics of non-SEN adolescents because they are an essential and effective part of inclusion. Knowing the characteristics of this group is useful when designing programmes that are suitable for both SID and non-SEN groups. The current study will focus on girls' schools, because women are not allowed to enter boys' schools in the KSA.

1.3.3 Education of the intellectually disabled in KSA

In the KSA, disability is a more prevalent medical and social issue than it is in the rest of the world (Alhasan, 2018; Jan et al., 2017). Out of a total population of around 33 million, 0.87% have some kind of disability. SID is prevalent in around 8.9 per 1000 children. Seventy percent of these have moderate SID, while 30% suffer from severe SID (Jan et al., 2017). Also, approximately 4% of students in primary education, 3% of those in secondary education and 10% of those who are in universities have SID. Furthermore, 0.87% of adults have a disability (Ministry of Saudi Education, 2015). Thus, we conclude from the above that SID form a large percentage of Saudi society. Attention must, therefore, be paid to service delivery for SID. These services are there to provide the appropriate environment for education and to try to engage those with SEN with their non-SEN peers. Researchers and teachers should study the obstacles and issues they face in education to try to solve these problems, for example

problems associated with poor inclusion of SID students in school, a lack of means or strategies to encourage SID teaching, and the ability for SID to become autonomous in the community.

SID refers to the learning, reasoning and problem-solving difficulties that are faced by people, particularly children. SID can be categorised into three groups: mild SID, moderate SID, and severe SID. The Regulation of Special Education Programmes and Institutes highlights these different levels of disability (Alquraini, 2011). Different teaching methods are used for each. Alnahdi (2016) argues that, in KSA, SID is offered as a subset of special education and the government offers two types of educational placements: mainstream schools and institutions. An individual with severe SID is placed in an institution, which provides services that are relevant and in keeping with their condition. Those with severe SID may receive education in different institutions. Also, SID students are offered food and financial aid (Hussain, 2010).

Those with mild and moderate SID are placed in mainstream schools. These are regular schools that offer special education and services. These students are able to engage fully in the general education curriculum, which is supplemented with special programmes and specially-trained teachers. Education services provided to the SID students include vocational, social and academic skills programmes. They are also taught art and sports (Alquraini, 2012).

Education in KSA is changing and reforming based on Vision 2030. That means those who provide special education are being equipped with different learning strategies and methodologies. The Ministry of Education has established a system of educational teacher training programmes, which will aid SID in varying ways. Some of these strategies and programmes aim to educate SID children and offer extra attention and services where necessary. These Ministry of Education programmes involve teaching students about behaviours and attitudes in the world around them. Furthermore, it increases their experience and helps improve their condition. Alongside this, the government has implemented a system of segregated education that recognises the type of SID that the student suffers from, since some of the SNSEN education fails to adequately equip them (Ministry of Education, 2019).

According to Alhammad (2017), there are many learning strategies proposed by the Saudi education ministry for teaching SEN students. These strategies are effective in different ways. However, they are very challenging for teachers to implement. For example, dealing with SID students requires patience, time and the use of appropriate teaching strategies, and this is true of all teaching anyway. However, this makes connecting information and concepts of mathematics and science difficult and frustrating for the teacher. First, when SID students are being taught, teachers have a hard time maintaining their attention in class, as some are easily distracted by other things, such as what is happening outside. Second, using tutorials as a teaching strategy can be labour intensive, and some students do not concentrate and keep asking the teacher to go over previous discussions. Additionally, when students are placed in group discussions, some engage in behaviours, such as making noise. Furthermore, teachers' use of a step by step teaching strategy can be a waste of time, as some students have difficulty comprehending various abstract concepts (it depends on the sorts of special needs that a student has).

As much as the SID students are willing to learn, they face difficulties in the classroom (Alhasan, 2018). First, some of those teaching SID students lack experience of catering and caring for them. This becomes a liability, since they are not in a position to equip them with skills or respect their special needs. Second, teachers might be trained but lack experience on how to deal with these profound and severe disabilities. For example, most SID students require more medical attention than other students (Wilkin, 2016). When teachers treat them all as equals, some may miss out because of their disabilities and thus be placed at a disadvantage. Some teachers may develop compassion and care for some of their students, but when the "isolated" students notice this, their self-esteem may be lowered and they may become sensitive. Third, Alhammad (2017) claims that a shortage of teaching assistants is a big challenge in the SID class. This is because almost every student requires a teacher's attention and guidance. Therefore, they require an appropriate number of teachers. Although many schools today are moving towards the accommodation of special needs, especially when SID are placed in inclusive classrooms, some issues and challenges should be considered. For example, training and preparing teachers is the first thing that leads to the success of a special needs school.

Special education in KSA is purposefully formulated to educate students with special education needs (especially SID) by including them with SNSEN in a mainstream class. The

SID students require the provision of services to help them improve their academic situation. Al-Zoubi and Bani (2016) and Battal (2016) assert that teachers are unable to balance the needs of both SID and SNSEN students. For example, the general education system prohibits true inclusion of SID students with their SNSEN peers. As it stands, the system requires extensive training of teachers before full inclusion is achieved. With limited special needs training, teachers are likely to exhibit negative attitudes towards inclusion programmes. An inability to deal with the needs of SID students will also undermine efforts to develop a comprehensive system (Young, 2018). Also, when enrolled in mainstream schools, SID students face a myriad of difficulties which mean that teachers are unable to integrate them with SNSEN or cater to their needs. For example, some SID students face discrimination from SNSEN students, owing to their condition.

Thus, teachers and students face difficulties when it comes to inclusion. Perhaps the most effective way to foster inclusion is to include them in the same class. However, this will present difficulties for the teacher, because SID students have different needs. Furthermore, this may lower the self-esteem of SID students, leading to a decrease in academic performance. It might raise self-esteem if students think they are being treated like everyone else for once. Therefore, researchers must find solutions to this problem by searching for a strategy that suits all students in all the categories.

The prevalence of SID is higher among adolescents (Flexer, Baer, Luft and Simmons, 2012). Therefore, teachers should focus on using strategic teaching for SID (Alnahdi, 2016; Alfleaj, 2001). First, teachers may provide tutorials and pictures to the SID to help them understand and store what they learn in their long-term memory. Secondly, teachers may teach social, hygiene and communication skills, which the SID can use in their daily activities and in the outside world. Peters-Scheffer, Huskens, Didden and van der Meer (2016) assert that special education is enhanced by teaching practices such as prelinguistic milieu teaching, which focuses on the specific interest and abilities of SID students and which helps to boost a student's self-esteem, self-determination and motivation. Additionally, another efficient teaching technique for professional SID students involves breaking down bigger tasks into smaller ones that are easier to handle. This ensures that the student is not overwhelmed and that they learn progressively, step by step (Al-Sughayr and Ferwana, 2012; Hodgetts and Park, 2017).

The teaching strategy helps students to involve themselves more practically, and this promotes their understanding of concepts. Each student has their own level of intelligence, depending on the severity of their SID. The mode of education can be inclusive for those with mild disabilities (Bogdan and Biklen, 2013). However, those with severe SID are educated away from their peers. This is to ensure that they are given as much care and attention as possible (Alquraini, 2012). As the current study focuses on vocational rehabilitation, details on vocational rehabilitation in KSA's special education provision will be discussed in the next section.

1.3.4 Vocational rehabilitation with SID in KSA

SID is more prevalent amongst adolescents (Flexer, Baer, Luft and Simmons, 2012). It is at this stage at which various comprehensive options for career choice should be introduced to the students. This is so that they can be aware of and be prepared for whichever choice of career path they choose. This brings purpose to the learning process and enables them to have open minds when it comes to employment (Hussain, 2010). The students learn not just so they can perform better socially, but so that they can become more empowered.

People with SID are employed at a low rate. Usually, most people are reluctant when it comes to employing people with disabilities. However, there are still people who are ignorant of the fact that being SID does not necessarily mean that one cannot work. According to Bogdan and Biklen (2013), in the US, the physical examination required by most employers usually excludes SID from employment opportunities due to the physical demands of these jobs or the safety of the employees. While individuals affected by SID may not show physical impairments, their ability to coordinate activities in some situations is limited (Yousef, 2019). This condition limits their ability to perform optimally in physically demanding job environments. Despite the many welfare programmes offered by the KSA government for the disabled, those with SID face discrimination. Due to this, few jobs are offered to those with SID. What is more, keeping their jobs is also a challenge (Alquraini, 2011).

They can have vocational counselling. They are able to undergo training in making career choices, as well as social training. This helps them learn how to mingle with other people and communicate freely with them, depending on their line of work (Hussain, 2010). The KSA government, alongside international health organisations, is trying to develop a reasonable

policy that promotes the employment of the SID (Qureshi, Al-Habeeb and Koenig, 2013). These are people who have gone through the curriculum and studied hard and who have chosen a career path. That makes them as fit for employment as any other individual. Although they might not be able to handle complex cognitive tasks, there are less cognitively demanding jobs that would suit them (Al-Sughayr and Ferwana, 2012).

In KSA, SID students above 15 years old are moved to the vocational rehabilitation classes found in the typical secondary level schools. Once they attend these classes, each student is required to undertake a unique programme known as "The Transitional Programme". The main objective of the programme is to prepare and equip them with their professional skills. Students are taught activities that include developing social and communication skills. For instance, they may learn how to behave when meeting new friends and within the community they live in. Additionally, they are also taught technical and professional skills which may help them survive in the outside world. These skills include sewing, photography, weaving, as well as selling in the market (the buying and selling of goods). According to Alfleaj (2001), SID students are also trained and advised on how to deal with different life scenarios. SEN and teachers believe that limited job opportunities are the main challenges faced during training programmes. Most teachers find it easier to learn professional skills than to learn academic skills (mathematics, science, physics) (Watson and Gable, 2010; Dweck, Walton and Cohen, 2014), given that academic skills may require higher cognitive ability.

However, in the US, any person living with SID and has attained the age of 16 years old qualifies to be trained to learn professional skills (Rast, Roux and Shattuck, 2019). Even though training involves both academic work and vocational skills training, much focus is put on the latter. The training is conducted by professionally trained instructors, who must attain at least a diploma level in the course of teaching people who are SID. The employment rate for this group is, however, low in the US where 55% of the trained obtain employment (Roux, Rast and Shattuck, 2018). Moreover, in the UK, one must attain 18 years of age to be registered for vocational rehabilitation for SID (Luecking et al., 2018). The training involves both academic work and vocational skills training. Professionally trained teachers oversee the training at all vocational training centres across the country. According to Poppen, Lindstrom, Unruh, Khurana and Bullis (2017), the employment rate for trained people living with SID currently stands at 68%.

In KSA schools, according to Alfleaj (2001), special education teachers are assigned several duties. These duties include: designing lessons to train students in vocational skills, and the selection of suitable teaching strategies depending on the competence of the SID and the subject involved. For instance, in photography classes, students are provided with a camera, so that they can enhance their understanding of photography. Each student's performance is then evaluated through their ability to take a certain photo. However, due to cognitive challenges faced by SID in the population, other study strategies are preferred; for instance, a teacher helping, directing and providing models to some of the students. However, the role of professional rehabilitation teachers in the US is to design learning programmes that conform to SID learners (Migliore and Landa, 2019). While on the other hand, professional rehabilitation teachers in the UK follow already designed learning programmes in teaching the SID students (Plotner and Marshall, 2016).

The assertion that KSA lacks adequately trained teachers in a regular classroom to handle students with disabilities underlines the need for better efforts to train these teachers, if efforts for an inclusive curriculum are to be achieved (Alfleaj, 2001). Currently, a lack of professional expertise in the inclusive classroom means that SEN students struggle to cope with the rigours of the standard curriculum. Poor handling of special needs students also means that a significant number discontinue their education or continuously feel frustrated when interacting with the inept teachers. Learning outcomes for these students thus become negatively affected (Alnahdi, 2014). Also, Alquraini (2015) suggests that universities in Saudi Arabia should provide a new module on teachers' general education and on special training for teachers on how to help SEN students access the general curriculum, in order to overcome the lack of teaching training. Biawzir (2010) and Aldabas (2015) also suggested that teachers should be taught modules that focus on fostering inclusion. While, lack of enough trained instructors at special needs vocational rehabilitation centres is one of the impediments facing vocational rehabilitation of the SID in the integration classes both in the US and UK (Langi, Oberoi, Balcazar and Awsumb, 2017). Similarly, according to Kaya et al. (2016), students with SEN require more time and attention to cope with other students who are intellectually upright. However, teachers often fail to accord such students enough time owing to the time constrain.

We can conclude from the above that there is a problem in the employment of intellectually disabled people across society. This is due to their low abilities, lack of appropriate training,

and stigma. Nevertheless, it is possible to train intellectually disabled people in simple professions so that they can live independently. One example is photography skills. The next section will discuss special education teachers in KSA.

1.4 The teachers of special education in KSA

In Saudi Arabia, 30 different colleges and universities offer undergraduate programmes to prepare teachers. The programmes focus on different categories of disability: learning disability, autism, intellectual disability, hearing impairment, multiple disorders, communication disorders, visual and emotional behaviour disorder and early intervention (Alquraini and Rao, 2018b). Teachers who complete these courses receive a special education bachelor's degree. In contrast, in the US and UK, teachers involved with learners with SEN undergo special training that is different from the normal teaching course (Luecking et al., 2018). For example, in the UK, teachers with a bachelor's degree in education must undertake a compulsory diploma course in special education (Kaya et al., 2016). However, in the US, all teachers must acquire a minimum of diploma course in special teaching.

In KSA, Alhammad (2017) showed that the courses offer inadequate teacher education; teachers are taught in one of two ways: a general education pathway, and teacher preparation for working with SEN. Inclusive education in general education during this program is not given much attention, particularly in the Saudi context. This is in similarity to studies in Western countries (Murry and Alqahtani, 2015; Alhudaithi, 2015). Morley, Bailey, Tan and Cooke (2005), in a study of Great Britain, Ahmmed, Sharma and Deppeler (2012), in a study of Bangladesh and Amr (2011), in a study of Jordan, also argued that teachers in the mainstream classroom were not well prepared because they did not receive sufficient training in how to cater for SEN. However, various studies indicate that the majority of teachers from the US and UK are willing to accept and help learners with SID in their classes (Alexander et al., 2015). The same report indicates that there are some teachers, especially in the US, who are still not ready to accept the SID students.

Training teachers on how to deal with students with SID is necessary if they are to understand their needs. Teachers are also an important factor for the successful inclusion of non-SEN and SID. It is essential that the teacher masters the use of technology and has knowledge of the characteristics of SID students. However, a lack of teacher education in universities has a negative effect, and can lead to teachers being unqualified to teach students with SID (Gaad

and Khan, 2007). Teacher training in Saudi Arabia seems to lack one important component: training that can foster inclusion amongst SEN, non-SEN and SID students. The preparation of teachers in Saudi Arabia is based on specialised student instruction, which means there are general education teachers and special education teachers (Llewellyn and Hogan, 2000).

The existence of pathways designed only for those teaching SEN students leads to the notion that those students are different, and that they need specialised teachers to overcome their shortcomings (Hardie and Tilly, 2012).

Teachers are key in fostering class inclusion (Stanovich and Jordan, 2002). Some studies in different countries indicate that teachers have a positive role to play with students with SEN (Avramidis et al., 2000; Lampropoulou and Padellade, 1997; Minke, Bear, Deemer and Griffin,1996). In addition, several studies have demonstrated that teachers have negative attitudes towards inclusion (Minke et al., 1996; Agbenyega, 2007; Gaad and Khan, 2007; Kalyva, Gojkovic and Tsakiris, 2007; Fakolade et al., 2017).

Alquraini (2012) showed that teachers had somewhat negative views towards the inclusive education of SID students in KSA. Teachers have tended to be less willing to accommodate SID students in their classrooms, which contributes negatively to interaction between teachers and students with severe disabilities and to their classroom learning. This study looked at opinions of 303 teachers about the inclusion of SID students, using a quantitative survey. This study also examined the relationship between the views of teachers on the inclusion of SID students and teaching position. While, according to Dean et al. (2018), there is a section of teachers in the US who are opposed to the inclusive education system as currently instituted. Brucker, Botticello, O'Neill andKutlik (2017) assert that teachers opposed to an inclusive learning programme cite that students with SEN require a lot of time and special attention; thereby syllabus coverage is being derailed given that much attention will be given to them compared to other students.

Moreover, studies conducted by Cook (2001), and Cook, Tankersley, Cook and Landrum (2000) found that teachers and administrators accept the inclusion of students with SID less than students with learning disabilities and emotional disabilities. This study found that teachers are less receptive to the integration of the disabled when the severity of disability increases. Seventy mainstream classroom teachers nominated three students. These students were interviewed to understand their attitudes towards concern, indifference, and

rejection. Southern's further study (2010) indicated that teachers had a negative outlook on integrated education for SID (Kozub and Lienert, 2003). This result has been derived from a review of known attitudes in the literature and introduces a criterion paradigm that will help future researchers study relationships and attitudes. The results of this study will help researchers identify the trends and problems teachers face in mainstream schools. One of the most important issues teachers encounter is their inability to find a strategy that combines SEN and non-SEN students in the same classroom. Therefore, the present study will attempt to experiment with the universal design for learning (UDL) strategy in an attempt to include students with SEN and non-SEN together, and to reduce the problems teachers face when teaching. In the next section, of the UDL strategy, as one of the important strategies, will be explained.

1.5 Universal design for learning

One of the problems facing the KSA when it comes to inclusion is a failure to combine SEN and SNSEN students in the same classroom. In this vein, UDL can be an effective path to inclusion. UDL is an approach to teaching aimed at meeting the needs of every student in the classroom, including those with SEN (CAST, 2016). Also, it is one of those methods which might help to create inclusion (CAST, 2016). The Center for Applied Special Technology CAST (2015) has defined UDL as being a set of curriculum development principles that provide all individuals with equal opportunities to learn. UDL provides a blueprint for developing instructional goals, materials, methods and evaluations that work for everyone by giving flexible approaches that can be adapted to each requirement. This strategy was developed to provide flexibility in the learning environment as viewed by Meyer, Rose and Gordon (2014). The studies in the US indicated that UDL helps SID and SNSEN students be together in the same classroom (CAST, 2016). A hallmark feature of this design is the ability to utilise educational methods to meet the needs of individual students. UDL relies on three basic principles: Engagement, Representation, Expression and action (CAST, 2015). These principles try to attempt to overcome barriers students face in learning. Firstly, UDL uses a variety of means to teach lessons, such as multimedia technology, a smart board, and computers so that the students can see pictures and hear sounds. Secondly, it has multiple ways for students to express understanding of lessons throughout a list of tasks which a student deems suitable. These can be expressed through the recorded voice, in written formats or demonstrated throughout practical application. Third, giving students multiple

options to increase their motivation to learn and helping them integrate as individual learners or learning in small groups. For those who prefer individual learning or active engagement, electronic books will be availed to them, which will allow them to move the screen and browse images and shapes. Thus, the method is flexible to the individual needs and students' preferences.

In chapter 2, the topic of UDL will be expanded in terms of definitions, characteristics, benefits, disadvantages, and UDL theories. However, it is necessary to explain now the status of UDL in KSA and in respect of inclusion.

1.5.1 Education trends in Saudi Arabia concerning the use of UDL

The Tatweer Educational Services Company promotes the professional development of UDL educators in the USA (Alquraini and Roa, 2018a). In collaboration with the Ministry of Education in Saudi Arabia, the Tatweer Educational Services Company, a subsidiary of Tatweer Holdings, adopted the 2015 Regulatory Guide on Special Education to Monitor the Quality of Special Education in Saudi Arabia (Alquraini and Roa, 2018b). The King Abdullah Bin Abdul Aziz Public Education Development Project is the executor of the Tatweer Education Services Company, a policy plan to develop public education in Saudi Arabia. The company aims to provide high-quality education and innovative solutions to allow students and young people to access excellent education. Their mission involves working with partners to develop and implement innovative initiatives to enable the development of responsible and productive citizens, students and young people. In order to achieve this mission, the Tatweer Educational Services Company has created six new schools in Riyadh to promote the inclusion of students with SID and other disabilities (Alquraini, 2015). The company offers early childhood and elementary school programmes. Together with the Ministry of Education, they are keen to adopt innovative educational practices to achieve their vision and mission. We can see that Saudi Arabia is promoting UDL by providing information and workshops on UDL for teachers. This allows researchers to begin conducting experimental studies within mainstream schools to better understand the effectiveness of UDL.

Saudi Arabia, on the other hand, has a very different environment compared to both the UK and US. The implementation of the UDL system of learning has not yet been established in the country and considering that the nation's education is going through a number of reforms, the transition may take some time. Currently, the only schools seeking to implement

this system of learning are international schools, of which there are only 25 in the country. This is because the mode of administration in such schools is based on the international standards which feature the UDL module (Alquraini and Rao, 2018a), although the system used is still based on the traditional memorisation technique. However, the implementation of UDL in the US began in 2006, when a national UDL Taskforce was instituted to ensure that awareness was raised throughout the entire country (Ok, Rao, Bryant and McDougall, 2016). In the UK, UDL has also been established in many institutions, but its use is not as widespread as it is in the US and is confined to certain, mainly urban, regions (Ok et al., 2016). Although, as with the US, the UK has good governance and a good implementation framework to ensure the success of the process, it remains a challenge to implement UDL in rural areas (Barrio and Hollingshead, 2017).

To date, there has been little research on the implementation of UDL in schools in Saudi Arabia (Alsalem, 2015a; Alquraini and Rao, 2018a). Alsalem (2015) studied students who were deaf or who had hearing impairments in order to understand the effectiveness of UDL training programmes in schools. The knowledge, skill level and willingness of teachers to learn and implement UDL in their classrooms had a significantly positive effect on the learning of students. Alquraini and Rao's (2018b) study of faculties from 30 different colleges and universities in Saudi Arabia highlighted the necessity of incorporating more training that focused on UDL principles and applying such training in schools. This study also reacted to the findings of the only other study to date, by Alsalem (2015a), which showed that the implementation of UDL in classrooms was positively related to the experience of students with hearing impairments. Similarly, Alquraini and Rao (2018b) showed that teachers can effectively use learning and skills in classrooms, which will provide practical opportunities for students aspiring to be teachers and teachers taking graduate education. This is relevant because the UDL learners are provided with options such as multiple means of representation whereby teaching could be undertaken in forms like written work, pictorials, and even audios. The research is also relevant because it helps teachers in identifying ways of making the classroom more interactive. In so doing, they give the learners multiple ways of expression like written or verbal means from which they identify the one they are more convenient with (Al-Azawei, Serenelli and Lundqvist, 2016). Teachers also engage with learners as a vital aspect of assessing the lesson which helps in the identification of the learners' interests and their perception about the lesson (Gargiulo and Metcalf, 2017).

However, if teachers are to be able to implement UDL in classrooms, they have to be confident, competent and adequately trained. Increased understanding of UDL principles and their implementation in classrooms will enable more teachers to cater to SID. In the next section, inclusion in KSA will be discussed. This is a core topic in the special education.

1.6 Inclusion in KSA

Special education specialists in KSA seek to develop the inclusion in mainstream schools. The rationale for educating SEN students in mainstream schools is in the quest to eliminate discrimination and to enable students to acquit themselves to the realities of special needs students. The social and emotional development of SEN students is a crucial consideration for a specialist in inclusion policies since such efforts positively contribute to SEN social development (Abdou and Saleh, 2019). SEN students portray less positive social behaviour; thus, inclusion contributes towards improving multiple aspects of their social behaviour. Additionally, inclusion equips SEN children to overcome the challenges of transition through the various phases in life (Schwab, Gebhardt, Krammer and Gasteiger-Klicpera, 2015). Therefore, this environment fosters the use of new strategy to foster inclusion of SID with SNSEN students. First of all, Al-Mousa (2010) noted that the first attempts of inclusion in KSA began in 1984 in the city of Hofuf, in the Eastern Province. In 1989, children with SEN were enrolled into King Saud University Kindergarden. After that, partial inclusion was achieved in KSA with the creation of special classes in regular schools in 1995. Finally, students with SEN were fully included in 1996. Therefore, KSA is one of the leading countries when it comes to implementing inclusion in this way (ALShamare, 2019).

In contrast, several inclusive education services in both the UK and US have been established to ensure that there is a seamless inclusion of the SID learning programmes into normal learning syllabus (Beyer, Meek and Davies, 2016). Moreover, according to Kaya et al. (2016), inclusive education in the US began in 1975 while in the UK, it began in 1978. Both countries have successfully included the SID faculty in all colleges and universities offering educational psychology and child development (Dean, Shogren, Hagiwara and Wehmeyer, 2018). It can be seen that this is a positive step towards achieving inclusivity in the society as individuals living with SID feel a sense of belonging, they can acquire gainful employment just like any other person.

The KSA was the first Arab country to apply educational inclusion in schools and The United Nations Educational, Scientific and Cultural Organization (UNESCO) refers to this as the "Saudi Model". UNESCO also praised this as being pioneering in the Arab world (Alkhashrami, 2003). Moreover, Al-Mousa (2010) shows that, in KSA, partial inclusion occurs when SEN students are enrolled in special classes attached to regular schools. These students are taught in these special classes, away from their peers. However, these students are able to integrate with their peers, most of whom do not have SEN, because of the activities they undertake and the facilities they share. Also, inclusion is fostered when those with and without SEN are taught side by side in the same classroom, in this case these students need to go to the resource room to help them learn.

As for services for inclusion, in KSA, education and rehabilitation services for people with SEN are provided by a number of non-profit government ministries, the most important of which are the Ministry of Education, which provides educational programmes to students; the Ministry of Social Affairs, which offers financial support to those with SEN; the Ministry of Health, which contributes to the health of people with SEN; and the Ministry of Labour, which helps these students to find suitable jobs (ALMousa, 2008; ALShamare, 2019). The next section will illustrate about the challenges of inclusion.

Challenges of inclusion: In Saudi Arabia and other countries, inclusion is challenging for teachers since, for successful inclusion, there is the need for professional collaboration. Teachers feel that students with disabilities need a school that is specifically designed to cater for their special needs (Alhudaithi, 2015). For instance, teachers feel that students whose hearing capability is impaired would learn less in a regular classroom where every other student has optimum hearing capacity. Besides, these teachers may not have the required expertise needed to handle students with disabilities (Aseery, 2016). This perception is, however, contrary to the dream once held by the Saudi government when it became the first Arab country to try and implement inclusive education right the way back in 1984. Education professionals need to work together to identify, diagnose, refer and teach students with special needs. The primary purpose of the partnership is always to increase the effectiveness and quality of educational programmes for students with a disability within the general education setting. However, it is likely to be difficult to involve students who have a disability in general education without appropriate effective and efficient collaboration with general educators, physiotherapists, special educators, and speech educators (Afeafe, 2013). In

addition, Alanazi (2012) reported that in Saudi Arabia, there was no official and continuous collaboration between teachers for their mutual support. The absence of collaboration between teachers contradicts the requirements for inclusion.

Another challenge that is experienced by the teachers is weak administrative support. Administration plays a significant role in the successful implementation of inclusion. It can facilitate collaboration between professionals in the provision of education services to students. Without adequate and effective administrative support, most teachers find it challenging to involve students with disabilities in the general education programme. However, in Saudi Arabia, there is little encouragement or support from administration for professionals and teachers (Alquraini, 2011), which means that successful inclusion in Saudi Arabia is always limited (Ainscow, 2014).

The other challenge that is always experienced is inadequate professional development. It is apparent that for successful inclusion of students, there must be adequate staff preparation, as well as knowledge. It has to be taken into account that the professionals need to acquire skills to enable them to provide sufficient and appropriate services for children with disabilities in mainstream schools. The teachers require in-service and pre-service training for development. For example, in countries such as Singapore, teachers are required to have a minimum of 100 hours for professional development yearly. Again, in Saudi Arabia, teachers are not expected to participate in professional development opportunities to work on improving the implementation of inclusion (Ainscow, 2014). The inclusion strategies that are used in the UK and US mainly involve collaboration. Genuine inclusion requires an excellent partnership among professionals. This assists in increasing the effectiveness and the quality of the educational programmes for students with a disability within the classroom. Again, with the excellent administrative systems that they both have, they can facilitate collaboration among the teachers to give high quality services. With the use of appropriate educational resources as well as emotional support, they can successfully implement an inclusive approach. In addition, the UK and US ensure that professional development opportunities are offered. This is achieved by offering workshops on positive topics that promote inclusion. The educational agencies in these countries are working towards providing in-service as well as the pre-service training services for educators. These training sessions provide the opportunity to put into action what they have learned in terms of accommodating children with a disability and obtaining useful feedback (Al-Faiz, 2016).

Principals in Saudi Arabia need to take steps to provide support for successful inclusion. For example, if a problem is noticed, they should resolve it immediately. By doing this, they can work towards the creation of a positive climate that will foster collaboration as well as develop respect between the people involved in the implementation of inclusion. Efforts need to be made in terms of the use of coursework as well as field-based experience with disabled children. This provides the teachers with the chance to put into practice the knowledge gained from class, which will make it easier for them to include disabled learners in the mainstream classroom (Wang, Reynolds and Walberg, 2010).

Finally, resource availability is another factor influencing teachers' practice when implementing inclusion in mainstream classrooms. However, the majority of teachers in various empirical studies in Saudi Arabia indicated that their schools lacked materials, sports equipment and teaching aids (Alotaibi, 2011; Rajeh, 2013; Alibrahim, 2003). This lack of resources meant that the needs of students with special education needs were not being met (Minke, Bear, Deemer and Griffin, 1996; Fakolade, Adeniyi and Tella, 2017). In this respect, Alshahrani (2014) indicated that the availability of high-quality resources would help to implement inclusion effectively. There are many obstacles facing the inclusion of SID in KSA, but are these the same as those discussed in other studies? These obstacles allow researchers to identify barriers to inclusion and other teaching strategies used in mainstream classes.

1.6.1 UDL and inclusion

The UDL literature focuses also on the application of UDL in a variety of classroom settings to enhance instruction for students with different disabilities in other countries such as the US (see Coyne, Pisha, Dalton, Zeph and Smith, 2012; Kennedy, Thomas, Meyer, Alves and Lloyd, 2014; Lieberman, 2017; Meo, 2008; Narkon and Wells, 2013; Rao and Meo, 2016; Rose and Gravel, 2009). For example, this research focused on the teaching of very young students (Haley-Mize and Reeves, 2013; Stockall, Dennis and Miller, 2012), primary school students (Vargas, Beyer and Flores, 2018; Narkon and Wells, 2013) and those in middle and secondary schools (King-Sears, 2009; Kortering, McClannon and Braziel, 2008; Meo, 2008; Messinger-Willman and Mariano, 2010), and so on. These studies are full of examples of how students at all levels can access content and discuss various learning challenges faced by those with multiple disabilities and SID. The differences among learners could either be physical, sensory, or cognitive; hence the ability to note them prepares the teacher to realize optimum

learning in the students (Owiny, Hollingshead, Barrio and Stoneman, 2019). Studies have evidenced other differences such as language barrier while other learners possess behavioural and emotional differences depending on their background. These complications are most evident in children in their middle and secondary schools as they go through adolescence. Teachers learn how to create lessons from which learners achieve optimum benefit regardless of the evident individual weaknesses or strengths. This concept has been applied in settings such as where children are perceived to be very young whereby teachers have specifically identified ways of maximizing on learning amid the challenges experienced in such scenarios (Owiny et al., 2019).

Haley-Mize and Reeves (2013), as well as King-Sears (2009), provide examples of how UDL has been incorporated into different phases of planning and instruction. Vargas, Beyer and Flores (2018), Lieberman (2017) and Zascavage and Winterman (2009) focused on primary and mid-school classrooms and how successful teaching of those with different disabilities can be fostered. They also give advice on how learning needs can be met. Their work supports the articulation of the UDL concept which aims at limiting barriers to the curriculum while ensuring that all the students achieve the highest possible standards of a learning experience (Fakolade et al., 2017). Using the UDL principle, there is the assurance of equal access to education for all, regardless of the differences that exist among learners (Al-Azawei, Serenelli and Lundqvist, 2016).

Moreover, several studies that have focused on the successful use of technology showed how learning for those with disabilities can be improved with the application of technology (Hoppestad, 2013; Lancioni and Singh, 2014; Stock, Davies, Wehmeyer and Lachapelle, 2011), educational software (Murdaca, Cuzzocrea, Oliva and Larcan, 2012), multisensory products (Brug et al., 2012) and portable technology (Spooner and Browder, 2015). Several studies (Evans, Williams, King and Metcalf, 2010; Hall, Cohen, Vue and Ganley, 2015; King, Williams and Warren, 2011; Spooner, Baker, Harris, Ahlgrim-Delzell and Browder, 2007) have shown, both at pre-service and in-service levels, the importance of teacher training in the implementation of UDL. These studies evaluated the effect of UDL teacher training, discussed the positive impact of the training and made recommendations for how to incorporate that training. Teachers may need intensive training and practical training on a small sample of students before starting UDL.

Additional studies (Evans, Williams, King and Metcalf, 2010; King, Williams and Warren, 2011) discussed various challenges faced when implementing UDL in schools and suggested removing these obstacles. The UDL trainers must meet SID needs of all students throughout the course planning process and provide flexible resources that allow students to engage in learning in ways that better suit individual styles of learning (Evans et al., 2010; Vargas et al., 2018; Haley-Mize and Reeves, 2013; Hall , Cohen, Vue, and Ganley, 2015; King et al., 2011). The studies provide valuable information on the successful implementation of UDL in classrooms and suggestions to primary, elementary and high school educators. In the next section, we will explain the rationale and justification for the study.

1.7 Overview of this study

1.7.1 Rationale and justification for the study

The main policy ambition in the Arab world and KSA is the involvement of those with SEN in the community so that they can enjoy meaningful employment. Despite this, a huge number of people with SEN are unemployed (Alrusaiyes, 2014). According to Al-Oweidi (2015), mainstream schools are important for supporting those who have a vocational disability and, hence, it is important that international standards are applied for vocational rehabilitation.

However, international standards are not applied effectively. These standards need to focus on instruction strategies that are applicable to all students, including those with SID. Vocational rehabilitation of the disabled is an internationally recognized priority, and its core goal is to ensure equity between the disabled and the non-disabled. The international standards that exist relate to various factors, including employment, education, and social wellbeing (Fakolade et al., 2017). They ensure that the SEN is restored to their capability as regards physical, social, vocational, and economic relevance. The standards, therefore, relate to services such as education, vocational guidance, vocational training, and psychological follow-up. The training of disabled persons should take place under the same circumstances as those persons who are not disabled (Westwood, 2018). Attaining this principle necessitates the creation of special centres in which the disabled can be accommodated alongside the non-disabled (Tiwari, Das and Sharma, 2015).

According to Woodcock and Vialle (2010), inclusivity in classrooms is held back by poor instructional strategies, limited finance and a shortage of resources. This makes it difficult to provide special education. Thus, it is important to understand which instructional strategies are used by teachers in the classroom.

Special education specialists seek solutions to issues related to career training, for example: finding training strategies, finding job opportunities and using UDL to design an appropriate curriculum for teaching those with SID. The findings discussed in Alnahdi's (2015) study showed that only a few studies have focused on the adoption of instructional strategies to train SID in professional skills. Moreover, limited research focuses on the adoption of instructional strategies directed at training individuals with SID in professional skills.

Most existing studies that have focused on KSA have concentrated on training mainstream special school education teachers on the use of the UDL method (Alsalem, 2015; Alquraini and Rao, 2018a). This is because, through the UDL method, both the school curriculum and special education system have been improved (LaRocco and Wilken, 2013; Murray and Novak, 2008). Also, much has been written on the effectiveness of UDL interventions on both SNSEN and SID students when it comes to teaching strategies and opening up access to the entire curriculum. The results from Spooner et al. (2007), Kennedy et al. (2014), and Lee, Wehmeyer, Soukup and Palmer (2009) confirmed that the UDL method can have a long-term impact on high school students with SID and SNSEN. The first study to discuss UDL was published by Alsalem (2015a) in KSA. This study analyses the insights of teachers responsible for deaf and hard of hearing students and sought to identify challenges that affected the implementation of the UDL method in the KSA. The study showed that limited access to the Internet in schools was the most frequent challenge, and that a lack of adequate knowledge on the use of technology in schools was another. The second study that appeared that focused on the KSA was conducted by Alquraini and Rao (2018a). This study examines the challenges special education teachers face when using UDL in schools in KSA. The results demonstrate that teachers' professional skills should be developed to help the implementation of UDL. Participants also explain how they have to provide resources and technological equipment. However, there is no clear information on the impact that the implementation of the UDL method has had on the teaching of professional and academic skills.

Additionally, because of a lack of research into UDL, the challenges faced by teachers who use it in KSA are still unknown. Most UDL research in the United States involves SEN (Spooner et al., 2007; Kennedy et al., 2014; Lee et al., 2009). UDL has the flexibility to be used on students with a variety of intellectual disabilities because of its multi-faceted nature. Therefore, the UDL method will blend well with the teaching of practical skills, because of its reliance on technologies such as smart blackboards and computers.

According to the results from most studies, technology has positively impacted on how SID students are taught professional skills such as photography skills and speech training (Tam and Cheng, 2005; Tardif-Williams et al., 2007; Westerberg and Klingberg, 2007; Schoenberg ,Ruwe, Dawson, McDonald, Houston and Forducey, 2008; Manheim, Halper and Cherney, 2009; Lundqvist, Mara and Siljehag, 2015; Kesler, Sheau, Koovakkattu and Reiss, 2011; echoed by Larson, Juszczak and Engel, 2016). The use of social media and computers attracts students' attention, as do videos, graphics, and images. They all help students to hold onto and retain information in their long-term memory, because they rely on repetition (Larson et al., 2016). However, according to Alsalem (2015b), the use of these devices might not work as expected, because of the teacher's inability to control some students and deal with problematic behaviour. What is more, they may be hampered by software malfunctions and system failure.

1.7.2 Significance of the study

This study is seeking to explore the potential of UDL as a new strategy to integrate SID and SNSEN students in the same classroom. Thus, it will help to improve education standards by offering an alternative approach that sees instructional objectives, evaluation, methods and materials modified to address the needs of SID. Inclusion may be achieved, which would help these students become involved in society. Moreover, the results of this study can support the functional independence of SID through training on skills which any job requires by using UDL. Then, the student can search for a job suited to their abilities. Additionally, there are comparatively few published studies on using UDL to foster inclusion amongst SID and SNSEN in developing countries. This study, therefore, acts to encourage sponsors to develop such research. There is a lack of relevant research in KSA. Plus, that which exists has a universal outlook and is more focused on the development of academic skills (science, mathematics, reading, writing, etc) than on professional skills. Thus, this study contributes to our understanding of the universal applicability on the SID community. The aim is to provide high

quality knowledge that can be applied in society and which means that the research will have an impact beyond the respondents who participated. Furthermore, the results of this study will have an impact on policy and UDL projects in KSA. In addition, the UDL application options in mainstream KSA schools will be beneficial to decision-makers in the field of special education. Also, this finding will help students with special needs to further develop the field of teaching and will encourage their inclusion in Saudi society. Moreover, it is likely that the use of this new strategy will encourage positive change in the classes. Also, the application of UDL will contribute to the Ministry of Education's Vision 2030, which stipulates that the education system needs to be changed to match Saudi's social culture. The results of this study will add to the information that scientists can access to help them develop their future studies and advance the field of education.

Moreover, this study reinforces the fact that we also need to design training programmes. In essence, UDL research is unearthing the teaching techniques that education experts need to use to highlight significant concepts, clarify critical relationships, engage in professional presentation, and offer guidance and mentorship to the SID and their teachers (Ross, 2011). In the next section we will review research objectives.

1.7.3 Research objectives

The aim of this study is to explore the effects of UDL on the improvement of professional photography skills for SID with SNSEN. Further, the study aims to investigate the advantages, disadvantages and challenges faced by teachers using UDL in vocational programmes with SID students. Finally, the findings will seek to improve the education standards of SID by offering an alternative approach to learning, one that relies on instructional objectives, evaluation, method and material that can be modified and adjusted to address the needs of these students and foster a culture of inclusion.

1.7.4 Research questions

The UDL method with SID and SNSEN:

• What is the effect of using UDL on the acquisition of photography profession skills in vocational programmes for SID?

Is the UDL an effective method for integrating the SID female students with non-special educational needs female students in the same classroom, from the teachers' perspective?

The UDL and special education teachers in vocational programmes:

• What are the advantages, drawbacks and challenges associated with the implementation of the UDL method in the classroom, from the perspective of observers and teachers?

1.8 Thesis structure

This thesis consists of six chapters. This first chapter, the introduction, supplies a general overview of the thesis in terms of the rationale for conducting the study, research objectives and questions, and the significance of the study. The second chapter concentrates on the literature which defines UDL and describes its impact on the education of students with special needs, focusing on the Saudi context. In the third chapter, the methodology shows what research methods were applied to this study, and how, including an underpinning of the philosophical considerations adopted by the researcher. Thus, the methodology applyed in this study and the philosophy used is reviewed. Chapter four illustrates the results of the data. Then, chapter five discusses the findings of the study according to the research questions. Finally, chapter six explains the limitations of the study, research contributions, recommendations and suggestions for further research, as well as the conclusions of the study.

In the next chapter, the literature review will explain the previous studies which have discussed the impact of UDL on the education of all SNE and SNSEN students. Furthermore, this chapter will be demonstrating the meaning, types, and challenges of inclusion.

2 CHAPTER TWO: LITERATURE REVIEW

At the beginning of this chapter, will be explained the universal design of learning (UDL). Then, the impact of UDL on SID and SNSEN and on the inclusion of the former with the latter will be considered. We will also study the impact of UDL training on teachers' own education. Then will explain the theoretical background of inclusion in special education and identification of theories will be addressed. In addition, the difference between inclusion in Saudi Arabia and other countries will be revealed. Finally, strategies will be defined that assist in the inclusion of SID with their SNSEN peers.

2.1 The universal design for learning

2.1.1 The definition for the universal design for learning

One of the methods which might help in integration is universal design for learning (UDL) (CAST, 2016). As individuals often have a wide range of needs, skills and interests in learning, a single, one-size-fits-all solution may not be able to cater to these differences (Ashman and Elkins, 2011). The Higher Education Opportunity Act of 2008 (HEOA) in the US provides a concise definition of the term UDL (CAST, 2011). According to HEOA, the term refers to a scientific framework for directing or guiding educational practice that offers adaptability or flexibility in the ways data are presented, in the ways students are engaged, and in the ways students respond or show knowledge and skills, reducing obstacles in instruction, offering appropriate accommodation, support, and challenges, and maintains a high level of high accomplishment desires for all students, including students with disabilities (Meyere et al., 2014).

UDL is a set of principles for curriculum development which give every individual an equal opportunity to learn. It provides a blueprint for the creation of instructional methods, goals, materials, and assessments that work for every individual, not a one-size-fits-all solution but instead a flexible approach capable of being customised and adjusted according to individual needs (Hall, Meyer and Rose, 2012). This is necessary, as individuals often bring a wide range of needs, skills, and interests to learning and a single solution may not be able to cater for these great varieties of these. The framework addresses learner diversity at the start of the design or planning effort by suggesting flexible instructional techniques, materials and

strategies (Ashman and Elkins, 2011). However, this research relies on “the best definition of UDL” (Hall et al., 2012) because this definition is comprehensive and integrates the development of educational programmes, methods of assessment and teaching methods. In addition, it focuses on how to include those with special needs with SNSEN in learning.

UDL was derived from the fields of engineering and architectural design, which require a focus on designing buildings in such a way as to be easily accessible to all, including people with disabilities (Flippo and Caverly, 2000; Ralabate, 2011; Ashman and Elkins, 2011). The foundations can also be traced to a special curriculum that stressed the right of all learners to free, suitable state-funded training or education in environments with the fewest restrictions possible (Ralabate, 2011). The concept of the UDL system was introduced in the late 1980s by researchers at the Center for Applied Special Technologies (CAST). It was conceived as the alignment of three movements; namely, developments in education technology, advancements or progress in architectural designs, and discoveries from brain research (Ashman and Elkins, 2011).

UDL is a pedagogy developed by CAST to guide the development of a curriculum that meets the needs of all students. CAST is the abbreviation for Centre of Applied Science Technology and is also the name of software that is used by many countries globally as it contains valuable information for assessing the current status of implementation of UDL, as well as effective tools for applying UDL principles in the field of education. Its headquarters are located in Wakefield, Massachusetts, but its research takes place in four centres which are spread globally, including the Nestlé Institute of Health Sciences. Currently, the government of the UK is supporting CAST, and there are CAST centres in the UK at the Sandridge site and Longhurst site (CAST, 2016).

A UDL curriculum is often characterised by multiple representations of concepts and information, flexible alternatives in terms of performance and expression, and multiple ways of engaging learners in the curriculum. The UDL has a four-step process developed by CAST with an aim of helping educators bring UDL principles to any curriculum, thereby making it more accessible to all learners. In order to make the UDL curriculum more accessible, educators are required to work in teams composed of regular and special education teachers as well as other specialists (Meyer et al., 2014; England, 2012; Rose and Meyer, 2002; Ashman and Elkins, 2011).

The four steps of the process entail setting goals, analysing current curriculum, applying UDL to lesson development, and teaching the UDL unit or lesson (England, 2012). In the first step of setting goals, it is imperative that educators have a clear understanding of what the students should learn. The learning goals should be consistent for every student (Rose and Meyer, 2002). In the second step, educators should analyse the current curriculum by focusing on the profile of the entire class. This will help them to identify curricular barriers, thereby being able to help them eliminate such barriers. It aids in simplifying concepts being presented and helping learners with organisational and study skills. Thirdly, educators are required to apply UDL to the lesson development. Having a clear curriculum goal and a good understanding of barriers, educators can identify effective teaching methods (England, 2012). In addition, it helps educators to give students alternatives to demonstrate their understanding of the topic (Ashman and Elkins, 2011). Finally, the UDL lesson or unit should be taught or used in the next lesson when all students demonstrate their learning of the concepts. This implies that the process of planning for all learners, PAL, is effective and if not, the teacher should revisit the lesson and revise it as required. Generally, joint curriculum planning is beneficial and effective in enhancing students' learning.

The main goal for UDL is to give every individual an equal opportunity to learn by providing a blueprint for the creation of instructional methods, goals, materials, and assessments that work for every individual (Wehmeyer, 2007; CAST, 2011; Martin and Hanington, 2012; England, 2012; Ashman and Elkins, 2011). A flexible approach can cater for the huge varieties of needs, skills, and interests that individuals often bring to learning. UDL is helpful in addressing learner diversity at the start of the design or planning effort by suggesting flexible instructional techniques, materials and strategies (CAST, 2011). It therefore assists in improving and optimising teaching as well as learning for all individuals in the light of knowledge gained through investigation into how people learn (Martin and Hanington, 2012).

The purpose behind the UDL curriculum is to help learners master a particular information set or a particular set of abilities or skills, as well as to master learning itself, thereby becoming expert learners (England, 2012). This will enable them to develop three broad attributes; they will become strategic, goal-directed and skillful; knowledgeable and purposeful; and inspired to learn more. Additionally, planning an educational programme

utilising UDL permits educators to eliminate potential barriers that could stop learners from realising this essential goal (Ashman and Elkins, 2011).

UDL diminishes barriers to instruction, thereby giving all learners the chance to access, take an interest in, and progress in the general education curriculum. It provides flexible methodologies that can be modified and balanced for individual needs by giving outlines for making instructional objectives, materials, routines, and evaluations that effectively work for all individuals (CAST, 2011; Rose and Meyer, 2002; England, 2012). Lack of sufficient experience on the part of instructors is one of the major barriers to instruction in KSA when it comes to inclusion schools. According to McMahon, Cihak, Wright and Bell (2016), although most of the instructors in these environments are well prepared due to spending time in college, they lack the experience that would have been necessary to handle challenges that stem from dealing with inclusion school settings. The lack of sufficient experience also makes it difficult for the instructors to adhere to KSA instruction requirements that require them to include their apprentices in each classroom activity (Sermier Dessemontet, Morin and Crocker, 2014).

2.1.2 Circumstances that led to the emergence of UDL

Historical circumstances: The UDL was designed together with the UD principle in an attempt to provide an equal access to everyone without forcing them to adapt, unlike in the past when the traditional system was used. The old system made it difficult for students to perform well, as SID were not noticed, making it harder for them to cope in class (Izzo and Bauer, 2013). The traditional teaching model for students with SEN takes into account the differences between SEN and non-SEN students. Teaching SEN students requires additional efforts to maintain an organized classroom environment to ensure that distractions are limited (Fakolade et al., 2017). The teachers also have to break down their instructions into tasks that can be managed by the students. For instance, a student with SEN may find it hard to comprehend long-winded or several instructions delivered at once. The model also involves the use multi-sensory strategies to ensure that every student understands the instruction (Fakolade et al., 2017). Traditionally, most disabled students have been left behind due to the unequal methods of learning used in the past. This resulted in a disadvantage to those members of society who could not lead their lives like the rest (Ok et al., 2016). The reduction of the curriculum barriers ensured that the students who had

sensory and physical challenges as well as those with cognitive disabilities were able to achieve their education more easily (Ok et al., 2016).

Theoretical circumstances: The move to UDL was also made to encompass the language barriers in education as well as students going through emotional or behavioural issues. There was an unfulfilled need in education to develop lessons that were able to benefit the students, irrespective of their individual weaknesses (Ok et al., 2016). One of the factors that gave rise to this necessity was the unbalanced workforce that was seen in the entire professional world (Ok et al., 2016). Most professionals were well qualified but lacked the ability to perform in the workplace as a result of the education system at the time (Ok et al., 2016). Education systems change over time in various countries, and this change has an impact on the productivity of the teacher (Garcia, 2016). Considering a teacher whose goals do not align with the education system, for instance, proves this form of disconnect. In some countries, the system changes into a more predetermined framework that requires strict adherence to curriculum and syllabus (Hanushek, Schwerdt, Woessmann and Zhang, 2017). Even so, a teacher may want their students to thrive in co-curriculum activities by helping them discover their talents. Unfortunately, if the curriculum does not give such provisions, a teacher will not be able to perform in the sector. Similar results would be realized depending on the school's administration regarding the support for the pursuit of a teacher. Teachers who have had decades of service in their profession also find it difficult to deliver if the changing education system sets in with newer requirements (Hanushek et al., 2017). In order to deal with this, it became necessary to develop an education system that would be able to properly cater to each and everyone's needs properly.

Political circumstances: For the UDL to be fully implemented in the US, the first implementers of the system, then the various organisations who implemented it had to ensure that they joined the National Task Force of the UDL. The major actors in this included the National School Boards Association, the American Federation of Teachers and the National Education Association (Barrio and Hollingshead, 2017). With such a strong and well-defined taskforce, in 2001 they were able to influence Congress through sponsoring various Congressional briefings regarding the need for UDL (Izzo and Bauer, 2013). As a result of this, UDL was included in major legislation for education in the post-secondary and the K-12 systems. This move in the US made the UDL system well known and more countries sought to implement it.

2.1.3 The Cognitive Development Theory and UDL

UDL is derived from Piaget's theory, which was developed in 1936 by Jean Piaget. To know how UDL theory works with Piaget's theory, we should define the theory and its stages. Piaget was the first psychologist to propose studies in cognitive development. His studies were very detailed and involved the observation of cognitive abilities such as sensorimotor, preoperational, and concrete operational and formal operational abilities, among children. Piaget used a series of simple and ingenious tests to test for the differences among children in terms of cognitive abilities. He developed a theory, which showed that children think differently from adults (Piaget, 1976).

This theory has five stages of development that enable the learner to transition from one stage of development to another, namely the sensorimotor, preoperational, concrete operational and formal operational stages. Special education students have no issues in accepting and understanding the sensorimotor phase because they already have gone beyond it since it takes place between birth and their point of acquiring language (De Leeuw, De Boer and Minnaert, 2018). However, when it comes to the preoperational stage, special education apprentices have problems accepting that they cannot appropriate logic for solving issues that their peers have no problem in solving. Their acceptance of this challenge stems from the fact that they realize their inabilities when it comes to using mental capabilities to make logical deductions. These children have more advanced difficulties in accepting their inability to deal with problems that have to do with concrete events, which is a major feature in the concrete operational phase (Carter et al., 2014). Children that have intellectual disabilities are unable to come up with systematic deductions. The formal operational phase is most frustrating for special needs apprentices, and especially those that have to deal with intellectual disabilities. According to McMahon et al. (2016), this is because by the time they attain 15 to 20 years of age, they have already acknowledged that they, unlike other students, have issues thinking about abstract concepts. The sensorimotor stage, which is the period between birth and two years old, is the stage wherein the infant beings to understand themself, as well as reality and how things work, by interacting with the environment (Rose and Meyer, 2012). Learning at this stage is undertaken through assimilation and accommodation, as the infant absorbs information into the existing schema and modifies the schema to include objects that cannot be assimilated. The preoperational stage occurs between the ages of two and four; at this stage, the child is unable to

comprehend abstract objects, and therefore concrete physical situations are necessary for learning (CAST, 2015).

The concrete operational stage occurs between the ages of five and eleven. At this stage, the child has already accumulated physical experience and is capable of comprehending and conceptualising abstract objects as well as creating their physical experiences through logical structures. The formal operations stage takes place between the ages of eleven and fifteen and does not require concrete objects as the child is now capable of deduction and hypothetical reasoning. At this stage, the ability of the child in abstract thinking is the same as that of an adult (Rose and Meyer, 2012; CAST, 2018).

In this study, we will focus more on the concrete operational stage, because the study focuses on SID and SNSEN teenagers. Thus, we must know how UDL works with the previous stages, especially the concrete operational stage. The stages are crucial to UDL because it is concerned with the development of curriculum that has to meet all students' needs and should, therefore, take into account the different stages of child cognition in order to produce a curriculum that is effective for all stages (Rose and Meyer, 2012). In other words, UDL focuses on curriculum design that is appropriate for all stages and age levels, taking into account the developmental stages of each student, as in Piaget's theory. In further detail, UDL involves the development of a curriculum that has to meet all students' needs and thus the implementation of UDL relies heavily on the knowledge of the cognitive growth of the child, and how the child can comprehend different types of information at different ages (CAST, 2015), as discussed explicitly in cognitive theory. Hence, for an effective and efficient curriculum that addresses all the needs of the learner, the implementation of UDL should consider all the stages in the cognitive theory and merge them with the stages of its implementation, to ensure different levels of cognition are represented fully in the curriculum to facilitate learning for the child.

According to Piaget, the development of an appropriate curriculum should be aligned with not only the physical and cognitive ability of the learners, but also their emotional and social needs (Rose and Meyer, 2012). Piaget's theory focuses on children's thinking in the learning process, as well as emphasising self-initiated learning and the active involvement of the child in the learning process. The theory assumes that all children go through similar developmental sequences but at a different rate. Ideally, teachers are expected to design

classroom materials for various class groups rather than the entire classroom level (Piaget, 1976).

Overall, UDL is derived from Piaget's theory, and CAST (2016) has developed a framework of UDL based around three principles, namely engagement, representation, and expression. These principles work to achieve the stages described previously in cognitive theory. The application of UDL principles in a learning environment is aimed at enhancing education and making it more accessible to all by providing a rich support base for learning and reducing barriers to education and curriculum success, while maintaining high achievement standards for all students involved. Through the use of this system, educators can tailor their curriculum and design lessons that every student, regardless of their weaknesses or strengths, can fully benefit from (Rose and Meyer, 2012).

Learners differ in many ways, including the manner in which they perceive, comprehend and represent material and information provided to them (CAST, 2018), a factor that makes inclusive learning a challenge to many institutions and educators. However, the application of the UDL framework eliminates existing barriers, a factor that makes these principles crucial for the development of inclusive education (Rose and Meyer, 2002).

In the UDL model, different forms of engagement, representation, and expression are provided to the learners, thus ensuring no student is left behind in the learning process. For example, for blind students, instructions can be provided in Braille or in audio versions (Courey, Tappe, Siker and LePage, 2013). Presenting information in different forms such as PowerPoint, images, and Excel can also aid in decreasing learning disadvantages for students with disabilities, a factor that makes UDL significant in the learning environment (Hall et al., 2015; Hoppestad, 2013; Lindqvist, Larsson and Borell, 2015). Figure 1 (CAST, 2018) illustrates the relationship between the cognitive theory and the three principles of UDL. It is clear from this figure that UDL consists of three elements: what, how, and why. These elements are where the primary brain networks come into play. According to Rose and Meyer (2002), the first network is the affective network, which represents the "why" of learning, or how learners become engaged and remain motivated to reach this network through the provision of several means of engagement. Engagement involves motivation and encouraging students to learn through meaningful instruction, hands-on activities, and creativity in order to sustain their interest (Courey et al., 2013). An effective learning tool should possess several means of engagement to capture learners' interest and encourage them to learn (Spencer, 2011).

Hence, as designers of the learning environment, teachers must focus on their learners' engagement with the learning process. In order to do this, they should begin by concerning themselves with the accessibility and usability of the materials to gain a greater understanding of engagement, be it in individual work or group work (Marino et al., 2014). Engagement under UDL provides options for self-regulation through promoting beliefs, expectations that optimizes learning motivation, develops reflection, and self-assessment. UDL aims to provide choices for sustaining efforts and persistence that foster the collaboration and increase mastery-oriented feedback. In addition to recruiting interests, it seeks to optimize learners' options and autonomy and to minimize distractions and threats (CAST, 2015).

Figure 1: The relationship between the cognitive theory and the three principles of UDL

The second network is a recognition network: the “what" of learning. It relates to the student distinguishing the facts, the classification and interpretation of everything that is read, written or seen. The information is communicated to the student in this type of network by providing multiple means of “representation”. Representation involves linking students’ prior knowledge and experiences to the new concept and making strong connections with related and already mastered concepts. Representation also involves giving learners multiple means of acquiring new facts and knowledge in acceptable and flexible ways (CAST, 2015). The learner chooses the most appropriate method of acquiring information that best suits them according to that student’s abilities or disabilities. This means that the learner has a wide variety of alternative ways to access information until they find the method that will make it easier to understand the content (Centre for Training Enhancements, 2015). As a form of representation, electronic materials are widely used for students to enhance their achievement levels and to allow more interaction with these materials (Moody, Justice and Cabell, 2010). Electronic materials are a digital version of the original printed books and materials that includes animation, texts, pictures, 3D, and videos that allow more opportunities to represent the materials in multiple ways (De Jong and Bus, 2004). Digital materials allow students with disabilities to access information and knowledge as well as increasing the level of engagement and interaction with these materials among students. UDL relies on technology to provide different ways to allow students to learn, interact, and engage with the content that they want to learn (Dalton, McKenzie and Kashonde, 2012).

The third type of network is strategic network, which represent the "how" of learning. This refers to training students in planning and performing tasks through organising and expressing their ideas. Reaching this network is done by providing multiple means of “Action and Expression” (CAST, 2015; Rose and Meyer, 2002). Action and expression indicate to any form of alternative methods that allow learners to demonstrate their learning and understanding in many ways, rather than relying on traditional forms of assessment, such as exams and regular assignments (Courey et al., 2013). This aims at giving learners alternative means for demonstrating what they know. Through UDL, learners are encouraged to show how much they possess intellectually through different means. Students with disabilities often lack the skills that build the transitional bridge to access the general education curriculum and be successful in school. Evidence suggests that using technologies such as digital texts and translational support enhances the outcomes for students with disabilities (Anderson-Inman and Horney, 2007). By implementing multiple means of action and

expression, learners can access new ways to respond by providing many options to complete assignments through different media such as speech, text, or other forms (IRIS, 2015). Learners are systematically different in the way that they function strategically; dealing with diverse learners whether they are novices and experts is challenging. Therefore, UDL provides many options that match the learners' variability across a variety of executive functions. UDL shapes the learning process through action and expression by showing learning embodied in many ways that allow learners to express their understanding in the best way that fits with their abilities (Meyer et al., 2014). Thus, UDL encourages students to be more creative and to think more critically (Hehir, 2009).

The inclusion of Piaget's theory in UDL is a strategy that can be aligned with the future goals and needs of the present diverse classrooms. Piaget's theory of cognitive development provides a complete theory that can be used to explore the nature of human development (Dean, Lee-Post and Hapke, 2016). Furthermore, UDL is deeply rooted in the works of Piaget; thus, there is a strong relationship between the cognitive theory and UDL. This provides a useful analysis of the manner in which human beings acquire knowledge and use it in their different environments (Izzo and Bauer, 2013), because this theory focuses on child-centred learning in both open as well as centralised classrooms to promote the acquisition of knowledge. Moreover, the principles behind UDL advocate an appropriate learning environment that will encourage the acquisition of knowledge by all children equally. Piaget's theory and UDL are related in the sense that both seek to promote better learning capabilities to enable the diffusion of knowledge. This, therefore, means that the UDL employs Piaget's theory in order to ensure learning is achieved; it is important to explore different strategies that will ensure that the required knowledge is obtained. UDL makes use of Piaget's theory through a reorganisation of the mental process to take into account the biological maturation of the learners as well as their environmental experience (Ok, Rao, Bryant and McDougall, 2016). UDL also seeks to ensure that children are able to construct an understanding of the world around them and thus adjust their ideas appropriately with the learning environment (Ok et al., 2016).

Although Piaget's theory offers many benefits, various problems with the theory have been identified. First, recent evidence suggests that the stages of cognitive development are significantly less systematic than suggested by Piaget. The transition stages are less abrupt than had been previously suggested, and some children may reason quite differently when

exposed to certain tasks that exhibit a similar structure. There are numerous criticisms of the theory, with recent discoveries identifying the underlying assumptions as exhibiting significant implications for UDL. For instance, Piaget believed in an action-oriented approach whereby cognitive development is determined by physical manipulation of external objects. However, there are children born disabled such that they do not have the physical capability of outward action. An example is the children who develop paralysis; thus, they cannot move their limbs. The UDL theory recognizes such children's ability to still have normal cognitive development (Carlson and Buskist, 1997). Further criticism regards the stages of development, which are considered so broad that they could be either inaccurate or wrong; hence the underestimation of children's development. The theory also does not offer enough evidence for the existence of qualitative difference in cognitive capacity (Gray, 2006). In this regard, Piaget may have underplayed the role of social factors and practice in the learning process and may have over-estimated the ability to use abstract logic, in his studies. It has been argued that UDL should, therefore, adopt a non-Piagetian approach to cognitive development to ensure that the mechanisms are utilised to enhance the learning process (Weiten and Wight, 1992; Carlson and Buskist, 1997; Gray, 2006). Therefore, this present study proposes the use of the multiplicity of senses theory to support Piaget's theory.

2.1.4 The multiplicity of senses theory

The multiplicity of senses theory is one of the basic improvement criteria through which students enhance their skills and abilities to maintain the needs of optimal learning. This theory was put forward by Henri Bergson (Anderson, 2017). He suggested that human senses are not only identical but must operate within their distinct capabilities to produce logical reasoning and the ability to handle abstract concepts. According to him, it is when diverse human senses, which operate based on mind functionalities, act in harmony that an individual is deemed intellectually sound (Sermier Dessemontet et al., 2014). To enhance the learning skills and abilities of students, teachers must understand their needs along with their abilities. According to Ali (2012), multisensory "teaching sessions are action-oriented and involve constant interaction between the teacher and the student and the simultaneous use of multiple sensory input channels reinforcing each other for optimal learning". With the establishment of the multisensory training programme in learning, students can have a better learning atmosphere and easily communicate with the teachers regarding their concerns. Multisensory training is one of the features of the Gilingham approach, which is

action-oriented and entirely concentrates on teaching techniques (Ali, 2012). The Gilingham approach has several stages of learning such as Language-Based, Multisensory, Structured, Sequential and Cumulative, Cognitive and Flexible among others (Riccio, Sullivan and Cohen, 2010).

The auditory technique is associated with hearing and speaking learning methods. The visual technique correlates with seeing and perceiving methods and the kinaesthetic technique relies on touch, movement and doing methods. These optimal learning elements can trigger the learning process of students and enhance the memory capacity effectively (Gilakjani, 2012). This approach provides multiple engagement processes for students and their active learning such as the UDL approach. According to the UDL approach, information for learning is accessible through human senses including touch, sight and smell, which help students to acquire knowledge in a different but effective manner. Contextually, UDL strategy and the Multisensory approach provide quite similar techniques of learning and training.

2.2 The advantage and the disadvantage of UDL

All students can benefit from UDL because of its two major aspects, namely emphasis on a flexible curriculum and the wide range of instructional practices, learning activities and materials involved in UDL (Rose and Meyer, 2002). UDL has multi-faceted ways of presenting contents, which benefit all learners, including older ones and those learning English (CAST, 2011). In addition, it has multi-faceted options or alternatives for demonstrating what students know. UDL normally offers information in many formats, including visual, texts, audio, hands-on and video which gives all learners an opportunity to access the material in the way that best suit their learning strengths. Therefore, learners are able to acquire information and knowledge they need. Additionally, it gives all learners different ways of interacting with the material and demonstrating what they have actually learned. By demonstrating what they know, the educators are able to assess students using methods such as oral presentations, pencil-and-paper tests or group projects. This increases the understanding of the students (Ashman and Elkins, 2011).

On the other hand, UDL helps to interest learners, offering appropriate challenges and increasing their motivation. It looks for diverse methods of motivating students such as making skill building look like games as well as creating opportunities for learners to get up

and move freely around the classroom (Karger and Currie-Rubin, 2013). Educators can sustain the interests of students by letting them make choices and by giving them assignments that are relevant to their lives. UDL reduces barriers to instruction, thus giving all students the chance to access, take an interest in, and progress in their general education curriculum (Rose and Meyer, 2002). Students with special education needs face a wide array of barriers which could be physical, technological, systemic, financial, or attitude-based. Inadequate funding is a significant barrier that limits the access to elementary and secondary school education due to the special needs of these students; special arrangements need to be made for their accommodation and other expenses to ensure that they are comfortable at school. There are also negative attitudes and stereotypes, ineffective dispute resolution methods, the lack of individualization, and physical inaccessibility to essential amenities (Hong, 2015).

However, despite the advantages of UDL, it is often costly, excessively tedious or time-consuming, and sometimes later changes to the educational modules are made unnecessarily. UDL requires a huge amount of funds and resources to maintain. Additionally, it takes a considerable amount of time to establish and maintain (Hall et al. 2012). The reason for that is assistive technology is essential in implementing a UDL educational design, which in turn offers accessible content for curricula, helping to increase the value of assistive technology (Basham et al., 2010) such as the iPad and computers, that would allow them to live independently when they leave high school, thereby improving their chances of maximising their achievement and independence (Blackorby and Wagner, 1996).

For example, in 2008, Skylar calculated the cost savings for SEN students of using an iPod Touch, which can cost $3,000, even without the computer, speakers and scanner required. Kurzweil 3000 software, which can cost around $500, has also been designed for readers facing difficulties, dyslexics and students with care disorders. It can also cost between $800 and $2,500 dollars for a laptop capable of operating Kurzweil 3000, calculators, electronics organizers, calendars, multiple alarms, and mobile Internet access. Finally, a data storage device for flash drives can cost between $20 and $100.

2.2.1 Assistive technology and UDL

The term assistive technology refers to a product or piece of equipment that has been commercially purchased, removed, modified, or customised and used to build, maintain or

enhance functionality for disabled people (Johnston, Beard and Carpenter, 2007). Technology can contribute to a better quality of life for SID students (Wehmeyer, palmer, Smith, Davies and Stock, 2008).

There is a clear relationship between UDL and assistive technology because UDL is a framework that includes various sources and tools of technology (Basham et al., 2010). The strong relationship between UDL and technology, though, does not mean that UDL is about technology; instead, UDL includes purposeful technology aimed at helping students (Nelson and Basham, 2014). Technology helps with the implementation of UDL through providing for flexibility and supports UDL by the use of digital instructional materials (Nelson, 2013). Burgstahler (2003) pointed out three examples of accessible electronics and IT, and how the concept of UDL could help students with disabilities in educational settings:

1) Accessible webpages, such as those that provide access to information and communication for students with poor reading skills.

2) Accessible educational software, such as Programmes enabling students to work side by side and to work with their peers to complete classroom assignments.

3) Accessible telephones which, regardless of disabilities, make communication accessible to all.

Therefore, Special education teachers, especially in middle and secondary schools, should be exposed to technical tools that can help students overcome their academic weaknesses (Mull and Sitlington, 2003). Also, in many cases, technology could play an essential and important role in helping students with disabilities overcome their academic problems and helping them develop their academic skills. Cullen, Richards and Frank (2008) conducted a study to determine whether computer software would enhance the writing ability of students with disabilities. Seven students in fifth grade with mild disabilities were studied with a multi-media device in three phases: a baseline, a word processor intervention and a word prediction software intervention combined with a word processor. Students gave handwriting samples without help in the first week (first step). In the following three weeks (intervention step) students wrote by using the Outloud program. At the end of the three weeks, students used the Outloud program with Co: Writer which is a word prediction software. The results showed 5 out of 7 students had an increased number of words across the two intervention phases, while the number of words produced in both intervention

phases decreased compared to the baseline in both intervention phases with the other two students. The mean group suggested that the number of words produced had improved. The number of misleading words improved in each phase, both individually and in the group mean. In general, the results showed that the impact was positive for most of the seven students.

Bouck, Doughty, Flanagan, Szwed and Bassette (2010) examined the efficacy of a pen top computer (a FLYPene) and written software (designed explicitly for FLYPen) to assist students with handicaps in writing. This study shows how technology has played an important role in helping students to overcome their academic problems. This tool is similar to a standard pen, except it is larger and contains a software cartridge at the top. Using special paper created for the FLYPen, the pen top computer produces speech to provide instructions, enhancements and suggestions for different activities for students. Three high school students were selected for this study on the basis of the following criteria: firstly, high school students receiving special education between the ages of 15 and 18; secondly, students with moderate SID or learning disabilities; thirdly, students who had difficulty expressing themselves in writing; and fourthly, early primary school students who had received special education services. The results showed that all students had initial gains in written expression quality while using the FLYPen. It was concluded that enhanced technology facilitators could benefit the quality and quantity of written expression in students suffering from mild disabilities. What is more, it can also help the students to plan their writing and help them complete tasks more independently. Raskind (1994) suggested several technologies that can be helpful in supporting students with disabilities to overcome challenges: word processors, spell checkers, revision programmes, brainstorming, speech recognition, and abbreviation extensions, speech synthesis technologies, optical character recognition systems, free-form data bases, and speech calculators. Cutler (1990) concluded that spell checkers are useful for helping disabled students overcome the challenges they face. Collins (1990) found that the use of word processors helped to improve the writing skills of disabled students. Brown and Watson (1987) found that speech synthesis, together with word processing, was useful for improving written language production.

However, Mull and Sitlington (2003) found five obstacles that prevent students who have disabilities from using technology: firstly, difficulty in using assistive technology; secondly, the availability of assistive technology and its high cost; thirdly, the abandonment of assistive

technology devices purchased by students; fourthly, training requirements relating to the use of such technology and equipment; and lastly, questions of eligibility.

All of these studies on the barriers to using UDL will help to support the results of the current study to identify the constraints of UDL from the point of view of teachers in Saudi Arabia, given that it is possible that there are no studies of the constraints of UDL when teaching the intellectually disabled.

2.2.2 The UDL with SNSEN

Many studies have demonstrated the efficiency of UDL with non-special education students. One of these is that undertaken by Kurtts, Matthews and Smallwood (2009), which sought to determine how UDL could support teachers who struggle to develop lessons that permit all students, including those with learning difficulties, to access and engage with general science educational modules. Kurtts et al. (2009) show how an optional physical science lesson about dissolvability and focus can be developed to meet the needs of all students by implementing UDL ideas. Moreover, Zhong (2012) found that the UDL can help students master search skills effectively. She describes UDL as "an emerging paradigm to outline course direction, materials, and substance to benefit individuals of all learning styles without adaptation or retrofitting (Zhong, 2012, p. 33). The examination investigates various UDL rules that could be applied to library instruction by providing one general lesson plan and one lesson plan focusing on instructing Boolean Logic. Zhong (2012) presents information on these plans and examines them in order to assess the effect they have on instruction. She concludes that an adoption of UDL can enable students to enhance their search skills successfully.

Kumar and Wideman's (2014) study focused on the development of a health sciences course. This study aimed to investigate to improve this course by using technology means with UDL principles applied. Students were offered an assortment of methods for representation, engagement, and expression throughout the course, and were surveyed and interviewed after completing the course in order to determine how the UDL-inspired elements of the course impacted their view of its accessibility. In general, the students reacted positively to the course outline, and felt that the integration of UDL throughout the course resulted in greater flexibility, social presence and reduced stress, as well as improving achievement. By and large, the students felt they had greater control of their own learning process and that their ability to make decisions to help their own learning had been enhanced. This course

design also resulted in greater satisfaction on the part of the teachers and reduced the requirement for intervention by the university disability services department.

Moreover, a number of studies have focused on social skills, such as Katz (2013), in which outcomes related to students' academic and social engagement were investigated in this study. Six hundred and thirty-one students with learning difficulties from Grades one to twelve from ten schools situated in two rural and three urban areas in Manitoba, Canada participated in the investigation. Mediation and control groups were evaluated before and during the intervention for academic and social involvement. The demographics of students and teachers, types of task and assigned grouping structures were studied to determine the effect on engagement. Students completed several measures of classroom atmosphere, feeling of belonging, student autonomy and inclusivity/restrictiveness. A selected few were observed to obtain detailed information about their engagement behaviour. The data were analysed using MANCOVA, which is a statistical method to "check for pretest differences in observed behaviors/variables (engagement, task assigned, grouping structure, and interactive behavior)" (Katz, 2013). Overall, intervention was required from SID students to co-plan an integrated unit of English, science and the social with grade-level peers. Also, all students worked together in heterogeneous groupings to master the curriculum using differentiated activities. The intervention (applied UDL inside the classroom) considerably increased students' learning behaviour, in particular their levels of active engagement, and encouraged social engagement through increased peer interaction, student autonomy and inclusivity.

Even in recent years, studies continue to show the effectiveness of UDL in education. For example, Cook and Rao (2018) explained that UDL is a new curriculum designed to remove learning barriers. They showed that, in US schools, English language students face cultural and linguistic obstacles that can hinder their academic success. The results showed that the application of learning environments and curricula based on universal design principles and guidelines increases the chances of success of language learners and promotes life-long learning skills for all students. The authors offer proposals for designing and implementing rules and guidelines for "English learning". Thus, we can conclude from Cook and Rao's (2018) study and previous studies that UDL is a curriculum that helps in the development of academic curricula for SEN students. However, no study of the effectiveness of UDL for the development of SEN students' professional skills has been attempted.

In addition, Levey (2018) sought to explore the use of UDL in healthcare. This study also explains that educators are starting to use innovative pedagogies that are accessible to different students in various learning environments. UDL is not well known as an inclusive strategy to achieve this objective in nursing education. An integrative review was used in the study; 45 articles, three studies and fourteen feature articles published between 2000 and 2013 were drawn from five databases. A literature matrix was used to summarise the critical design: marginalised students as a vulnerable population; lack of professional UDL knowledge; reaction to proactive education and good teaching practices.

This review shows that McGuire, Scott and Shaw (2003) stressed the need for effective and innovative accessible approaches for SEN students. The results illustrated that the use of UDL provides more accessible and equal learning environments for SEN (Shaw, 2011; Pliner and Johnson, 2004). Moreover, the results explain that faculty and academic institutions lack UDL awareness and orientation programmes (Embry and McGuire, 2011), because the teachers may not have the necessary educational background to understand UDL (McGuire, Scott and Shaw, 2006). In addition, for SEN students, UDL is a holistic approach (Scott, McGuire, and Shaw, 2003; Shaw, 2011) because it "reduces student needs for tutoring and accommodations that might lead to marginalization by faculty and peers due to perceived different treatment" (Levey, 2018, p. 4). For example, students with a temporary disability from illnesses or accidents can access and participate in a course used with UDL (Shaw, 2011).

Lastly, Hollingshead (2018) studied online classroom environments that used UDL principles. Educators frequently describe participation, such as it being a concept of emotion, cognition and behaviour. Student engagement in an online environment is challenging to achieve. Synchronous and asynchronous training must be meaningfully conceived to involve students. Furthermore, differences between students from various backgrounds may be more challenging and therefore require a deliberate and systematic approach in the online environment. UDL is an educational design framework based on the notion that all students have a different requirement for learning and that education needs to be flexible enough to ensure that everyone is educated. The study by Hollingshead (2018) raises significant insights regarding the need to effectively deliver both synchronous and asynchronous instruction. The ultimate goal is to engage the students more. This need is important because of the difficult nature of engaging students pursuing an online degree. Students come from diverse backgrounds and have different learning capabilities. Therefore, the UDL is vital in such a

scenario because it enables teachers to be flexible while giving instructions to ensure that diverse needs among students are well taken care of. In that study, the students were aged 18-25 years and were severely disabled.

Also, it has been shown that most of the studies (Hollingshead, 2018; Scott, McGuire et al., 2003; Levey, 2018; Cook and Rao, 2018; Katz, 2013; Kumar and Wideman, 2014) focused on developing academic skills, such as English, mathematics, science and reading skills. In addition, in the majority of studies, UDL has been applied to non-SEN students in elementary schools, and have confirmed the view that the application of UDL helps to increase the chances of learners' success and promotes learning skills for all students. There is strong evidence about applying the UDL accurately with non- SEN in other countries such as the US; however, there is currently a shortage of evidence about the inclusion of SID and non-SEN students together in the same classroom, particularly in the Arabic context, and about the impact of UDL on the development of professional skills in high schools with non-SEN. Based on all of the above, there is a fundamental question to ask: what effect does UDL have on the education and training of non-SEN students? The literature related to this subject will be reviewed in the next section.

Despite evidence in previous studies for the benefits of UDL in developing the curriculum, Bryans Bongey, Cizadlo and Kalnbach (2010) showed that, although students perceived added value in the UDL-enhanced site, the intervention of UDL does not necessarily lead to improved grades, suggesting the possibility that there may be an optimal blend of tools and approaches. The results of this study can be expanded upon in further research to identify the optimal support and to generalize the findings further by examining a wider range of subjects. The purpose of this study was to plan, implement and deliver the benefits of UDL to a large class of undergraduate biology students through the use of an online course webpage in the course management system (CMS), to establish a universal design and maintain it for the duration of one semester. The study by Bryans et al. (2010) identified the need to plan and implement the UDL model to facilitate optimum learning. The problem identified by the researchers was that a very small percentage of students in a classroom benefits from a learning process that does not apply the UDL model. Therefore, by using this model, there is an increase in the percentage of students who benefit from a learning session. The universal design of teaching was introduced and implemented in an online course, and was to be maintained throughout the whole semester. The participants were university

students pursuing an undergraduate degree in biology. The statistical analysis of the answers to the interviews and student performance revealed the benefits of UDL principles.

The argument in these two studies revolves around the need to foster learning in all students, regardless of their disability. The UDL framework has been successfully applied in the studies to provide equal opportunities for all students to excel in their academics.

2.2.3 The UDL with students of special needs (SEN)

Previous studies have shown that UDL may be helpful to all learners, including students with special education needs (SEN). It helps students with learning and attention issues to acquire knowledge and skills needed by providing flexible opportunities for assessment (England, 2012). This can be seen in Hall et al's (2015) study which used CAST's Strategic Reader, a technology-based system mixing UDL and Curriculum-Based Measurement (CBM) in a digital learning environment to enhance reading comprehension instruction. This experimental study assesses the effectiveness of the Strategic Reader using online and offline treatment conditions. Both quantitative and qualitative data on the tests are used to provide evidence that students using the online device experienced significant development in comprehension scores. The difference in score growth in the online conditions was particularly marked for students with learning disabilities. Furthermore, students with learning disabilities report being considerably more engaged by the Strategic Reader, finding many features of the tool considerably more helpful than did their general instruction peers. In summary, the results offer promising paths for curriculum design and for further exploration of the design of the digital environment.

UDL is frequently used for guiding the construction and delivery of instruction with the intention of helping all students, including those with special educational needs. In this respect, Kennedy et al. (2014) used a related model to direct the creation of a multimedia-based instructional tool called content acquisition podcasts (CAPs). CAPs delivered instruction in vocabulary through two simultaneous social investigations units to 32 students with special educational needs and 109 students without special educational needs. CAPs were developed using a combination of evidence-based practices for vocabulary instruction, UDL, and Mayer's instructional design principles. Secondary school students both with and without special educational needs completed weekly curriculum-based measurement (CBM) tests (vocabulary coordinating) over a period of eight weeks, and were then given two related

post-tests. The results showed that students with and without special educational needs made considerable progress in CBMs and scored notably higher on the post-tests when taught with the use of CAPs.

Vesel and Robillard (2013) studied the use of a Signing Math Dictionary to help the hard of hearing to obtain the vocabulary required to access mathematics content necessary for the topic they are studying. The investigation included eight separate classes, with a total of 39 members, eight instructors and 31 hard of hearing students in Grades four to eight. The outcomes recommend that, when used in a real classroom setting, it could also benefit students who are not hard of hearing in terms of supplementing their knowledge of mathematics vocabulary. However, the authors suggest that additional exploration of the use of the Signing Math Dictionary is necessary, in order to determine its usefulness for both experienced and inexperienced instructors working with hard of hearing students in schools for the hard of hearing and in inclusive settings, across maths topics and grades.

Previous studies have emphasized that UDL allows students also to demonstrate their learning using multiple methods, including oral and visual presentation, instead of just written assessments (Hall et al., 2012). In addition, UDL helps in building movement into learning by teaching a wide range of learning styles. It engages learners both visually and aurally by giving instructions in writing and orally. The use of different learning styles ensures that students with SEN also have the opportunity to acquire the same knowledge their non-SEN peers acquire with ease, and UDL offers guidelines for the development of lessons for that purpose (Ralabate, 2011; Johnson-Harris and Mundschenk, 2014). Hartmann (2015) shows how UDL can be used to help bring about change for SID as well as to enhance instruction for all students. The aim of Hartmann's (2015) study was to examine the use of UDL as one approach to supporting learners with severe disabilities to access authentic and appropriate curricula that can enhance their quality of life. Use of the UDL framework can assist in gaining a better understanding of how teachers can support such learners by reforming the curricula to create more and better options for all students.

Furthermore, UDL provides cognitive support to students with special needs. It helps learners organise information by presenting background information on new concepts with the help of videos, pictures, artifacts, as well as other materials that are suitable for the individual needs of such students. In addition, it ensures that a variety of materials are used in presenting, illustrating, and reinforcing new contents (Ashman and Elkins, 2011; King-Sears,

2014). Moreover, UDL uses multiple strategies in presenting content, hence enhancing instruction for students with special needs through the use of role play, web-based communications, music, hands-on activities, educational software, and cooperative learning (England, 2012). UDL advocates the use of a multi-sensory teaching technique that helps children with disabilities to learn effectively through more than one sense (Meyer et al., 2014). That is, UDL is a programme which uses assistive technology in implementing various teaching procedures. Alnahdi (2014) found that the technological approach of UDL contributes greatly to enhancing the learning capacity of students with a disability. This technique is often very helpful for learners that have language processing difficulties as well as more general learning disabilities; it increases their chance of acquiring the information being taught in class (Council for Exceptional Children, 2005; King-Sears, 2014). This was confirmed by Spencer (2011), who focused on UDL as a tool used for making lessons accessible to students in a proactive manner within current diversified classrooms. The goal of Spencer's (2011) study was to identify the main areas of UDL in terms of representation, expression, and engagement of disabled or special needs students in the classroom environment. The methodology used in the study comprised 'technology', 'flexible assessment', 'multiple modalities of instruction' and 'group activities' conducted with the selected sample of students in the classrooms. Spencer (2011) found that UDL resulted in the reduction of behavioural problems, the enhancement of 'meta-cognitive knowledge', as well as improvement in the access of UDL for special needs students.

Finally, UDL has been found to support individuals with dyslexia (Reid, Strnadová and Cumming, 2013). In addition, Wizikowski (2013) demonstrated the effectiveness of the use of UDL in enhancing the achievement of students with special needs. In order to achieve its aim, a pilot study was conducted with 79 respondents who attended a public university. The study found that the majority of the respondents were in favour of the inclusion of UDL in the educational system, especially for students with special needs. The modification of the curriculum through UDL also affects the behaviour of teachers as well as the students. Lee et al. (2009) observed the reactions of 45 high school students with special educational needs throughout a period of instruction in the core areas of UDL. The study showed that the curriculum modification in the schools under study had a positive impact on the general education system for the students with special educational needs (Lee et al., 2009).

Most previous studies have relied on exploring the impact of UDL on teaching academic skills to people with SEN. However, these studies (Hall et al., 2015; Kennedy, Alves, Meyer, Lloyd and Thomas, 2014; Vesel and Robillard, 2013; Hartmann, 2015; Spencer, 2011; Reid et al., 2013) were constrained to teach reading skills, learning concepts and vocabularies. The most noticeable shortcoming is that some of these studies have focused on students with learning difficulties and severe disabilities. In addition, many studies unanimously agreed on the use of technology such as multimedia, the Internet, and also the use of multiple teaching methods, for example cooperative education, peer teaching and rotor exchange. Therefore, the purpose of these studies was to improve the curriculum using UDL. Analysis of these previous studies is useful for understanding the impact of UDL for SEN in general and to predict the results of the application of UDL on the rest of the special education groups. Moreover, the results are useful for indicating how UDL programmes are designed. However, the question now is how can UDL be used with SID students? Can it be used to explain the impact of teaching the academic and professional skills by UDL? More details will be presented in the next section.

Conversely, a study by Marino, Gotch, Israel, Vasquez III, Basham and Becht (2014) found that there was not a great difference between the achievements of students with learning disability execution following UDL-adjusted units and those using conventional curricular materials. This study analysed the achievement of 57 students with non-special educational needs in conjunction with students with learning disabilities from four middle schools. Students were followed over an academic year in inclusive science classrooms as they alternated between conventional methods of instruction for some study units, and material that included video games and alternative print-based texts aligned with the principles of UDL for other units. The findings showed that the computer games and alternative texts were effective mainly in terms of offering students' multiple means of representation and expression. The UDL-adjusted units also resulted in an increase in the engagement of students with learning disabilities. However, there were no notable contrasts between the post-test results of the students with learning disabilities and their peers without learning difficulties.

2.2.4 The UDL with SID students

UDL presents information in ways that adjust to the learners' needs, rather than requiring the learners to adjust to the information (Rief, 2015). This is useful for children with learning

issues as well as those with attention problems since it gives them more than one approach to interact with the material. UDL can make it less demanding for children to make use of their qualities and minimise their weaknesses (CAST, 2011). UDL ensures that the required and appropriate support is in place to help SID to enhance their quality of life in a wide range of aspects including learning (Rose and Meyer, 2002). This result is confirmed by Chen's (2014) study which aimed to highlight the results of UDL intervention on students with a mild disability within the lesson plans. The sample for the study comprised 41 general educators randomly selected from an experimental session of UDL training.

UDL also ensures that curriculum and instruction are carefully modified in order to help SID reach their full potential in both the academic area as well as in other functional areas such as independent living (Shelly, Davies and Spooner, 2011). While these learners will have limitations in a number of practices, these limits will exist together with individual qualities in different areas (Meyer et al., 2014). Strickland's (2011) study showed that UDL has the potential to provide access to the general curriculum for SID. Both qualitative and quantitative approaches were used in this study, as was the ABA approach of single-subject design. The sample for the study comprised one teacher who works in public schools, and three students with severe and moderate intellectual disability. Although the sample was small, the study provided a comprehensive knowledge of UDL implementation and its effective access framework for the education of the SID students. This study was supported by the results of Saito-Kitanosako's (2008) study which aimed to discover the changes in the educational curriculum made through UDL for SID students. This qualitative study used case study methodology as well as the consultation approach to investigate the approach to the adoption and implementation of UDL. The impacts of UDL implementation in three different grade schools were evaluated and the result indicated the effectiveness of UDL as a part of the educational curriculum in dealing with the students with moderate intellectual disability.

UDL also ensures that self-reliance and independence are always essential objectives of each instructional strategy using SID (Gargiulo, 2012). Although a SID normally learns and understands fewer things, and at a much slower pace, than children without an intellectual disability, with the help of UDL, they can continue to learn and understand certain aspects of the world (Ashman and Elkins, 2011). However, there have been few studies that investigate the impact that UDL has on SID students in comparison to the number of studies that focus on UDL education for non-SEN and SEN students. These studies are either qualitative or

quantitative in nature, but only Strickland (2011) uses a mixed approach to data collection. Thus, the current study will also use a mixed methods design. The benefit of analysing the data in these studies lies in understanding the tools used and how to design UDL programmes with SID, which is one of the current study's objectives. However, an important question associated with the use of UDL is the effect of UDL on improvements to learning and fostering inclusion of SID with non-SEN students together. The next section will explain this topic.

Moreover, the findings of many studies have indicated that UDL is useful for SID in learning academic skills, while some have found that UDL can also help the independence of such students. Nevertheless, in this researcher's view, there are too few studies that focus on discovering the effect of UDL on the development of independence skills. Therefore, in this present study, emphasis will be placed on the development of professional skills to achieve independence for SID students. Accordingly, the study attempts to test the effectiveness of UDL in learning a particular profession. Professional skills are fundamental for the future autonomy or independence of people with SID (Ashman and Elkins, 201; Ralabate, 2011). Extra skill areas such as vocational training help in preparing SID for a specific trade; for instance, they can be assisted directly or indirectly to develop expertise in techniques that are related to skills and technology (McGuire et al., 2006). Vocational education helps to enhance practical knowledge as well as life skills that are applicable in the real world. The use of real materials or real devices in natural environments is a key part of the effective instruction of SID (Hall et al., 2012).

2.3 Inclusion

2.3.1 The definition of inclusion

The legislation that inclusion policy falls under is International Human Rights Law to allow the provision of education to all students. In the UK, laws prohibit discrimination in the education area and support the inclusive education system. It is unlawful for the teachers to be discriminatory. For instance, the UK government Office for Disability Issues has provided Road Map 2025, which aims to achieve disability equality (Al-Mousa, 2010). The Map states that equality is necessary for the individuals who are disabled so that they can have equal access to both good education and work (Al-Mousa, 2010).

In various countries, the Disability Discrimination Act (DDA) as an inclusion policy which states that the law will punish anyone who treats their disabled colleagues badly because they are disabled (Al-Mousa, 2010). Organisations such as service providers and schools need to make reasonable adjustments regarding the way that they provide their services so that the disabled can use them too. Inclusion policy legislation provides the core for DDA protection and will result in a new right offering protection for the friends and families of those who are disabled from discrimination through association. For instance, it will be considered to be illegal to mistreat an individual just because they are taking care of a disabled person. Policy legislation and laws are always supported by the United Nations and by their conventions. Points from the conventions together with guidance and the policies regarding working in partnership are applicable to efforts to bring about a positive change (Al-Mousa, 2010).

Researchers have been looking for new and novel strategies to integrate students with special needs into society. The definition of inclusion here aims to capture the general idea of a majority of the people in society (Bray, Clarke and Stephens, 2016). Regarding people with disabilities, individual education offers excellent opportunities for students with limitations to learn on the same basis as students with non-special education needs (SNSEN) in general education. Individual education means providing overall learning through academic, applied, and socialized programmes that result in positive learning outcomes for the SEN students (Alnahdi, 2014). An individualized education plan (IEP) focuses on the learner's disabilities, intending to reduce the student's difficulties (Hadidi and Alkhateeb, 2015). In inclusive learning programmes, individual education can enhance outcomes and ensure the success of the programme in KSA. On the other hand, according to Carmen (2016), inclusion in the field of education can be defined as an approach that aims at educating the students who have special educational needs, and rejects the application of individual schools or even separate classrooms for the disabled and the SNSEN.

Dovey (2014) defines inclusion as a straightforward principle, stating that "children with special needs should also be included in the regular activities and classes for children of their age". Dovey believes that each student has the right to an education and to be provided with the necessary conducive environment to accomplish this, a point of view that contradicts the traditional practices in many education systems. He acknowledges that these are students with special needs rather than students with disabilities, and these special needs arise from

cultural, psychological, social, economic, or linguistic factors. Removing these factors leaves a student with the same characteristic and attributes as those regarded as SNSEN, and thus these limitations should not be used as a form of seclusion, but instead, people and the society should overlook them and support all students (Dovey, 2014).

There has been development in and exploration of the rationale that is behind inclusion, and this can be seen in the provision for the children who have physical as well as intellectual disability in various countries. In many countries, disabled adults and children are excluded from the formal type of education that they should be given. They are still pushed out of the school system as a result of not being sensitive to the learning system or style (Dovey, 2014; Bender, 2013). However, the rationale for the creation of two parallel systems of education has led to the disintegration of special education, particularly in the low- and middle-income countries. Difficulties faced by SEN students adapting to mainstream education result in most of these students discontinuing their education. These students, however, require special needs education programmes that most schools are unable to provide (Battal, 2016). For example, the quest to educate SEN students in a manner that conforms to their non-SEN counterparts' systems undermines efforts to provide special education. Responsibility for all learners needs to be maintained under a regular teacher (Bender, 2013). The segregation of students with special needs and their education in special schools away from others without disabilities derails the implementation of inclusion schools. Having a single school system that incorporates all students regardless of their individual needs is essential, as it ensures every child is given the opportunity to excel in life and contribute to the development of the world. This is particularly important as disability is present in every gender, race, religion, ethnicity, and age, and including disabled people in mainstream society means that the estimated 15 percent of the world population with some category of disability are supported and catered for (Hayes and Bulat, 2017).

We need to include SEN students, but inclusion entails more than simply education for the children and parents with special needs. Furthermore, the normal classroom set-up as well as participation in activities is very beneficial in assisting children who have special needs to develop their social skills (Al-Fazul, 2015). Social skills for children with special needs can be developed by allowing them to interact with other students in inclusive learning milieus. According to Göransson, Hellblom-Thibblin and Axdorph (2016), this particular approach is essential for imparting the kind of confidence necessary for these students to reciprocate

during social interactions. Despite the fact that special needs children can learn a great deal from being around those with similar conditions, there can be a problem when they spend much time with those of similar conditions and behavioural issues. Al-Fazul (2015) indicated that the inclusion approach assists in improving the learning of both unclassified and classified students. Also, bearing in mind that most children learn by imitation, they could start imitating the characteristics and behaviours that are not beneficial to them.

The theories of inclusion examined in this study are the cognitive democratic theory as well as the social inclusion theory. When it comes to inclusion of special needs children, cognitive democratic theory connotes an approach that deploys democracy as an instructional tactic as well as an objective. Thus, in such a setting, the theory helps align democratic values to instructional methods, which helps impact self-determination and confidence into special needs apprentices by means of equitable treatment (Hord and Xin, 2015). The usefulness of the cognitive democratic theory is acknowledged, especially when there is especially when there is a need for teaching mechanisms to enhance the educational experiences of special needs children by creating learning atmospheres that are governed by trust, justice, and respect (Carter, Brock and Trainor, 2014). From such a perspective, the theory serves as a platform upon which instructors can instill cooperation values into both 'normal' and special needs apprentices (Pateman, 2013).

The other theory, social inclusion, holds that a classroom is only considered to be democratic and socially inclusive to the extent to which it allows all the children to be equally valued within the school community (Pateman, 2013). The social inclusion theory aims at reducing imbalances that might exist and to enable the student to be able to deal with the existing inequitable power relationship. For example, there exists an imbalance in power between a student with special needs and the rest of the students, as learners with special needs may be looked down upon, but a constant interaction between the two categories of students is bound to reduce the gap. When close relationships are created from constant interaction, those with special needs can express themselves freely without being intimidated, and their ideas accepted by the others, building their power and influence in the relationship and environment within which they operate. The method was applied in Australia, and it encouraged students to be active in their participation in all the phases of their activities. The teachers in the classrooms work with this theory to ensure that they provide a balanced

treatment. Inclusion stimulates knowledge formation as well as reconstructing the classroom for a new form of development.

Both the theories discussed above suggest that students must learn within the boundaries of social form which allows them to raise their self-awareness as a result of class interaction, and try to solve the problems which face them (Pateman, 2013). Despite the discussion of individual needs, it is necessary that a particular education agenda should be viewed as vital to the drive for education both for disabled students and SNSEN (Al-khashrami, 2015). The inclusion approach recognizes that the demands for specific learning may arise from psychological, social, economic, linguistic, and social factors, as well as disability factors. Inclusion also takes into account that any child can experience difficulties in learning, in the long or short term during their school career and this should make the school continually review its operations to meet all the learners' needs (Al-khashrami, 2015). According to the above, the requirements for integration are consistent with the SID definition in the Saudi context (see the definition of SID in § 1.1). The focus should be on the needs of SID students, which involves a number of discernible shortcomings in the individual's existing functional performance (Ministry of Education, 2002). Moreover, they have weakness on communication, self-help, home life, social abilities, self-management, health and safety, academia, and professional qualifications (Ministry of Education (MeE), 2002; Al-Kahtani, 2015).

2.3.2 The differences between inclusion and integration

The terms 'integration' and 'inclusion' refer to the process by which SEN students move from separate education to being educated alongside non-SEN students. Whereas the terms integration and inclusion are sometimes used synonymously by those working in schools and education, in reality they mean different things. Booth (2013) defined integration as the involvement of students with SEN in education and social life in primary and secondary schools in general. Zionts, Zalavras and Gerhardt (2005) builds on this definition and defines integration as bringing students together as a whole from segregated settings to mainstream environments. Foreman, Arthur-Kelly, Pascoe and King (2004) argues that integration is a process by which SEN students are moved to a less restrictive environment, allowing SEN students to interact with their colleagues at a general school rather than a segregated setting

(Lu and Wood, 2006). The term inclusion, is defined by Hegarty and Alur (2002) as ensuring the full scope of social and educational opportunities are available to every pupil, such as schools, Local Education Authorities and others who develop their cultures; policies which lead to the acceptance of SID students, with the aim of developing inclusive schools (Booth and Ainscow, 1998). These definitions suggest that inclusive education entails change across the entire school and the creation of an environment in which SEN students, including SID students, can take part without being excluded or ignored. Similarly, SEN students should be taught in an inclusive manner (Lipsky and Gartner, 1996; Booth and Ainscow,1998).

This changing terminology, from segregation to inclusion, not only reflects concern by specialised teachers that SEN students are not properly educated, but that they are also meant to shift the public's attitude on inclusion, bringing it closer to the realisation of an inclusive society (Thomas and Baneyx, 1997; Barton, 2003; Reid, 2005).

This comprehensive concept of inclusive education and the associated aspirations for equality have emerged in Saudi Arabia and inspired officials to take steps to create inclusive education. The Ministry of Higher Education has attempted to set up a department at various universities to teach about special needs and ways to deal with various students with disabilities. In recent years, the term inclusion has become more widely used throughout the whole world. In mainstream Saudi Arabian schools, all employees, including directors and teachers, must be prepared to meet the educational needs of SEN students.

2.3.3 The importance of inclusion from a number of aspects (social, educational and practical)

Inclusion has provided benefits for SID and SNSEN through supporting their unique needs in terms of academic, social, and communication skills. In addition, the inclusion has made it easier for families of SID to participate with their children in different activities in their schools because it encourages support from peers (Cole, Waldron, Majd, 2004; Downing, Spencer and Cavallaro, 2004). This means that parents of these children are able to move away from the view that they are the only ones dealing with having to educate disabled children (Koomen, Kahn, Atchison and Wild, 2018). By meeting with other parents that are dealing with the same predicament, they find it easier to take part in diverse activities. Moreover, the general education setting provides a chance for children to establish social

relations with their typically developing peers. Finally, general education trains SID to learn skills that help them work as useful members of society (Heward and Silvestri, 2005). The importance of inclusion will be explained in detail in the next section.

***Academic benefits of inclusion**:* the academic achievements of SID are enhanced by interaction with typically developing peers in the context of general education (Westling and Fox, 2009). For instance, students share their skills during activities and thus interaction with peers encourages them to acquire basic academic skills. Brock, Biggs, Carter, Cattey and Raley (2016) suggested that peer support agreements are one technique used to boost social interaction in mainstream classrooms, and thus to enhance interactions between learners with SEN and SNSEN. Another method that helps to improve interactions and foster favourable attitudes towards SEN students is offering instruction for students of SNSEN (Alhammad, 2017). In Saudi Arabia, Alaisqih (2002) discovered that offering a comprehensive programme for SNSEN students through lectures and events helped to change the attitudes of general education students towards those with learning difficulties.

Cole et al. (2004), in the context of the state of California, studied the effect of the education environment on mild SID achievements and results in reading and mathematics in 16 programmes in general education and special education schools. This study showed that SID accomplishment in reading and mathematics increased in general education schools in comparison to SIDs in special education schools. The participants were elementary school children with serious cognitive needs. Downing, Morrison and Berecin-Rascon (1996) assessed the academic progress of three SID in the general education setting. They found that these three students were able to learn academic skills, such as letter identification, as well as reading and writing skills. The students were elementary-aged and they had multiple severe disabilities including basic communication. In addition, Hunt, Staub, Alwell and Goetz (1994) studied the academic achievements of students with severe and multiple disabilities in cooperative learning groups in an inclusive environment. They found that these students were able to enhance their basic academic, social and communication skills as a result of their interaction with their typically developing peers in this context. The study was performed on elementary-aged students with severe and multiple disabilities. Hilton and Liberty (1992) examined the association between class placement and academic results of 200 SID. They found that the academic results of these SID were enhanced by an inclusive education environment, and that this in turn led to their making progress in terms of

functioning as more independent adults, despite their not having received adequate support from their teachers. The participants were also elementary-aged with severely disabling conditions. Furthermore, Brinker and Thorpe (1984) examined the achievements of 245 students with multiple and severe disabilities in terms of their Individual Educational Plan (IEP) goals in the general education setting. The participants were sourced from regular students' schools and they were severely SEN. They found that these students were more likely to reach their IEP goals than those who were educated in special education classrooms. Their academic skills, such as in reading and mathematics were enhanced in the context of cooperative learning groups in an inclusive environment. The findings of these studies clearly indicate the positive effect on SIDs' achievement in education in an inclusive setting with teenagers and multi disability.

Social benefits of inclusion: Several studies report that inclusion offers an opportunity for SID to enhance their social skills in terms of building relationships with their typically developing peers (Hunt, Soto, Maier and Doering, 2003). Kennedy, Shukla and Fryxell (1997) compared the different experiences of social interaction for SID educated in inclusive classrooms to that of those educated in separate classrooms. They found that the inclusive educational setting had a positive effect in terms of improving the social interaction and social support of SID. Peer interaction among students is important because it helps in the refining of social skills, access to social support systems, learning of peer norms and values. This goal can be achieved through interventions like the use of communication books and social interaction whereby the books used can contain pictures of conversational topics on socializing (Carter, 2018). Teachers can also have peer support arrangements whereby students are paired depending on their intellectual disability levels. Support for class participation and peer training are also interventions that will support social skill training in students with intellectual disability (Carter, 2018).

A study by Fryxell and Kennedy (1995) investigated the effect on the level of social contact students had with their typically developing peers of educating SID in a general education environment. They study found that SID had a higher level of social contact and made friendships with their peers in this inclusive environment. Similarly, Cole and Meyer (1991) compared the social competence of learners with severe developmental issues in a general education setting with those in segregated education in various elementary schools in a two-year period, reporting that the learners with severe developmental disabilities in general

education made progress on a measure of social competence, while those in segregated settings regressed. We conclude from this that inclusion is useful in difficult and severe cases. Thus, it may help simple cases, such as for those with mild SID. Furthermore, Brinker and Thorpe (1984) investigated the rate of social interaction for 245 SID in a general education environment, finding that these students had more frequent social interaction and had developed more long-standing friendship networks. Thus, the general education environment offered greater opportunities for SID to acquire appropriate social skills and construct friendships through their interaction with typically developing peers.

***Benefits for non-special needs students**:* Many studies of inclusion have shown that it can benefit not only SID, but also students without disabilities (Hall, Wolfe and Bollig, 2003). In the context of the US, Fisher, Sax and Grove (2000) carried out a 6-year follow-up study of the attitudes of high school students participating in elementary public school programmes designed to assist SNSEN in interacting with their disabled peers. They found that the attitude of the SNSEN who were involved in these programmes was more positive toward SID than that of the SNSEN who did not take part in programmesthem. Cole et al. (2004) assessed the academic outcomes for SNSEN who were included with students with mild learning disability and mild mental retardation compared to those who were not enrolled in inclusive classrooms. They found that the SNSEN who were engaged with SID peers showed greater academic skills than those who were not in inclusive classrooms. The SNSEN in Cole et al.'s (2004) study reported enhanced sensitivity, empathy, and acceptance of differences between people as well as greater access to cooperative learning opportunities and assistive technology.

Copeland (2004) reviewed literature on the effect of inclusive education on SNSEN and students with disabilities, including SID. They found evidence to strongly suggest that inclusive education for students with disabilities improves the achievement of students without disabilities in elementary school. Inclusion reduces the stress level in students with SEN associated with the segregation emanating from them learning in different facilities (McDonnell, Thorson, Disher, Mathot-Buckner, Mendel and Ray, 2003). When they are taught together with the rest of the students, they feel equal to them; hence with equal academic capabilities. Inclusion brings about changes in adaptive behaviour that resultantly improve their social wellbeing (McDonnell et al., 2003). It also increases the awareness of disability issues for SNSEN and their parents. In summary, positive outcomes for students

both with and without disabilities suggest that there is a need for students with disabilities to be included in general education. As shown in the literature, the inclusion of students with disabilities in general education succeeds in ensuring that SID have the same right to education as SNSEN and develop skills in various areas. These areas include academic achievement, communication, and socialisation in school (Cole et al., 2004; Foreman et al., 2004; Hunt et al., 2003; Westling and Fox, 2009). However, there are differing opinions as to how inclusion can be implemented for SID. It has been argued that it is necessary to have full inclusion in the general education setting for SID, whatever the level of their disability (Hunt et al., 2003; Westling and Fox, 2009). In contrast, others argue that partial or responsible inclusion is preferable. This is aligned to the principles of least restrictive environment (LRE), where decisions as to placement are made according to each student's individual requirements. The following section offers a brief discussion of the various models of inclusion (Hakim, 2009; Deng, 2008).

Although inclusion has positive aspects, it also presents some difficulties. A number of authors oppose the approach of full inclusion (e.g. Warnock, 2005; Kauffman and Hallahan, 1995) on the grounds that it can result in frustration, aggression, and failure. Furthermore, the idea of inclusion remains vague for some parents, who believe that inclusion may have a negative effect on learning and achievement (Alothman, 2014). Moreover, the geographical location of general education schools represents another difficulty for inclusion. According to Norwich and Gray (2007), the location of the school plays a significant part in the inclusion of children with special needs. For instance, outside urban areas, there are insufficient numbers of teachers with appropriate qualifications to teach children with special needs.

Indeed, Ainscow (2014) points out that the lack of well-trained and qualified staff is one of the main difficulties facing inclusive education. Many studies have shown that inadequate training of school principals and teachers has a negative impact on the success of inclusion in schools (Greenberg, Pinkus, Amato, Kristensen and Dorfman, 2016; Reid, 2005; Winter, 2006).

2.3.4 Factors affecting curriculum modification during inclusion

Teachers recognise the importance of the inclusion of SNSEN and changing the instruction offered in the regular curriculum (Kurth and Keegan, 2014; Ellis et al., 2008). Despite this awareness, there has been mixed evidence of teachers making these adjustments.

Adaptations that were often used had little effect on the teacher's usual teaching practices. Teachers found it hard to provide the child with SID with individualised training adaptations (Wilson, Zeithaml, Bitner and Gremler, 2016).

Evidence of the use of adaptations by teachers remained mixed ten years later (Ellis et al., 2008; Kurth and Keegan, 2014; Roy, Guay and Valois, 2013; Wilson, Zeithaml, Bitner and Gremler, 2016). While teachers have reported routine adaptations, such as changing expectations and employing different group work strategies, they have not reported making individualised instructional adaptations and rejected the principle of replicating special education practices in mainstream schools. These findings are problematic, since teachers have to make these adjustments to foster successful inclusion and there is reluctance to do so. It is therefore important to understand the factors that affect the decision by teachers to adapt their classroom for SID.

Evidence suggests that the inclusive behaviours of teachers are influenced by variables such as gender (Werner and Grayzman, 2011), educational experience (Varcoe and Boyle, 2014), lack of resources (Arbeiter and Hartley, 2002) and the age of the students (Rakap and Kaczmarek, 2010). While these are important factors, there is little scope for changing them to improve the use of classroom adaptations. Also, the beliefs of teachers are essential to aid the inclusion of SID students, which suggests that teacher cognition can play a role in the use of adaptations to accommodate students (Fiske and Taylor, 2013; Wilson et al. et al, 2016).

2.3.5 Attitudes of SNSEN students towards SEN students/SID in inclusion

Hartley, Bauman, Nixon and Davis (2015) argued that social integration of students with SEN with their peers is one of the factors that must be considered when implementing inclusion strategies. Moreover, Bebetsos, Zafeiriadis, Derri and Kyrgiridis (2013) argued that positive or negative relationships between students with and without SEN influence their behaviour towards one another. The Index for Inclusion (Booth and Ainscow, 2011, p.14) includes an indicator for inclusion that highlights the relationships among students, namely: “students help each other”.

There are a number of studies that have explored the relationships amongst students in mainstream schools. For example, Nepi, Fioravanti, Nannini and Peru (2015) focused on social development in Italy during “study”. They found that students with SEN were more likely to be rejected and less well accepted in such settings compared to students without

SEN. Similarly, Mullick, Deppeler and Sharma (2012) in Bangladesh, found that students with SEN were not accepted by their peers in mainstream schools and that general education students did not want to play with students with SEN. In addition, Carter and Spencer (2006), based on a review of some literature, concluded that students with SEN in mainstream schools are rejected by their peers.

However, Shogren, Gross, Forber-Pratt, Francis, Satter, Blue-Banning and Hill (2015), in the US, found that students with and without SEN expressed their support for inclusion, felt a sense of belonging in school and had good relationships with each other. In addition, students with SEN indicated their preference to be in mainstream (rather than special) classrooms. Moreover, students without SEN indicated their support for having students with SEN in the classroom. In addition, parents in a study conducted by Elkins, Van Kraayenoord and Jobling (2003) in Queensland, Australia, felt that their children, who had SEN, would benefit from inclusion in a number of ways: improved social communication; improved self-sufficiency; increased recognition and acceptance by their peers, as well as the opportunity to make friends with non-SEN students, which would allow disabled students to simulate and mimic their actions.

One challenge to implementing inclusion is bullying among students. Booth and Ainscow (2011, p. 14) suggest whether "bullying is minimised" is an indicator for successful inclusion. A student is being bullied if they experience negative action regularly compared to other students (Olweus, 1993). There are different forms of negative actions, either physical or verbal in nature (Olweus, 1997). These include: name-calling, teasing, severe verbal bullying, verbal aggression, threats, imitating, making fun of the students, physical attacks and taking belongings (Carter and Spencer, 2006). There are many studies that have explored bullying in mainstream schools, for example Hartley et al. (2015) found that students in the US with SEN experience more bullying and psychological problems compared to general education students. Hartley et al. (2015) suggested this is due to students with SEN usually not having the experience to cope with negative situations. Similarly, Mullick et al. (2012) found that students with SEN were bullied by students without SEN. Students with SEN were objects of fun and their behaviour was not tolerated by their peers. Thus, students with SEN were seen to be in a vulnerable position in school. A study by Alnahdi et al. (2019) showed that students at schools that include special education are more inclusive than students in schools with no special education programmes. Armstrong, Morris, Abraham, Ukoumunne and Tarrant

(2016) showed that the knowledge gained by SEN students is associated with positive attitudes. Also, the finding has indicated that older students are more positive than younger students.

2.3.6 Attitudes of special education teachers towards inclusion

Indeed, evidence suggests that teachers' inclusion attitudes influence their use of teaching practices, individualised education, teacher-parental collaboration and the classroom environment as a whole (Strogilos and Stefanidis, 2015; Sharma and Sokal, 2015; Ewing, Monsen and Kwoka,2014). The attitudes of teachers are dependent on the nature of the disability. Studies show more positive attitudes toward inclusion of physically disabled students than SID students (Rakap and Kaczmarek, 2010). This may be due to the different school adaptations needed to meet different learners' needs. Adaptations that require less time or have no impact on teaching are used more frequently, but SID requires substantial curriculum and training changes (Friend and Bursack, 2006). This can be difficult for the teacher.

Several studies have reported that teachers have positive attitudes towards SID, seeing inclusion as advantageous and fun (Avramidis and Kalyva, 2007; Ojok and Wormnæs, 2013). Others have reported neutral attitudes (De Boer, Pijl and Minnaert, 2011; Savolainen, Engelbrecht, Nel and Malinen, 2012) or negative attitudes (Alquraini, 2012; Chiner and Cardona, 2013; Hwang and Evans, 2011). This variability has made it difficult to draw reliable conclusions as to the nature of teachers' inclusion attitudes. The evidence does not bolster the positive attitudes of teachers towards inclusion. In addition to beliefs regarding inclusion in general, teachers view inclusion less favourably when asked about their inclusive teaching practice (Avramidis and Norwich, 2002). In addition, teachers found that they were generally less positive in terms of how easy they thought SID were to accommodate (Avramidis and Kalyva, 2007).

An already difficult and complex job is made even more so by the requirements involved when teaching SID (Loreman, Deppeler and Harvey, 2005). Thus, beliefs regarding the ease or difficulty of inclusive teaching adaptations may be important to consider, even if attitudes are positive. This suggests that other beliefs must be examined, as well as attitudes to inclusion. Wilson et al. (2016) indicated that the self-efficacy of how a person views a situation is an important variable to consider.

2.3.7 Factors affecting teachers during the inclusion

Personal factors: The self-efficacy of teachers relates to the perceived ability to teach and create a positive learning environment. Self-efficacy can influence the teachers' objectives; their time spent planning and their willingness to experiment with teaching methods (Klassen, Tze, Betts and Gordon, 2011; Zee and Koomen, 2016). Besides, effectiveness influences the persistence of teachers when confronted with challenges or when a particular teaching method is not successful. Evidence indicates that the self-efficacy of teachers plays a key role in the success of inclusion strategies (Hofman and Kilimo, 2014; Vaz, Wee, Lee, Ingham, Tanavde and Mathavan, 2015). The perception of teaching SID successfully influences the likelihood of curriculum and educational adaptations. Those who exhibit greater levels of efficiency work better with students struggling to learn. In contrast, less efficient people more frequently use strategies that harm their students' learning (Schumm and Vaughn, 1995).

Confidence and ability, alongside other internal factors, can affect teaching practices. These factors can influence the feelings of control teachers have, which can influence their decision to act inclusively. Therefore, it is important to understand the impact of teacher control when working with and fostering inclusion amongst SID (Wilson et al., 2016).

Social factors: Teachers work collectively within the school system rather than working individually. This means that important individuals (e.g. the head teacher, other teachers, and parents of students) involved in the school group can influence a teacher's willingness to adapt to the students.

Another important influence then is social standards. Social standards are related to the teacher's belief in what counts as inclusion and if other personnel perceive that they are using appropriate SID adaptations. Social standards provide guidelines on which behaviours are deemed appropriate (Ajzen and Fishbein, 2010). For example, evidence indicates that teachers are more inclusive when head teachers create an inclusive school environment (Boyle, Topping and Jindal-Snape, 2013; Chazan, 1994; Hammond and Ingalls, 2003). Thus, if teachers see inclusion as the norm, they are more likely to foster inclusion in their own classroom. This demonstrates the importance of teacher attitudes, self-effectiveness, sense of control and social standards in the successful integration of SID.

Personality is another crucial driver of behaviour (Furnham and Heaven, 1999). Conner and Abraham (2001) argued that personality could influence communication, using variables such as attitudes, self-efficiency and control perceptions or social standards. Studies investigating the role of attitudes, self-efficiency, control feelings and social standards on the behaviour of teachers become more general in the educational community. However, this cannot be the case, because differences in personality can influence the cognition of teachers.

2.3.8 Inclusion in Saudi Arabia

In Saudi Arabia, the concept of inclusion has attracted greater attention in the past two decades. This has led to an increase in the number of children with a disability attending mainstream schools (ALKhashrami, 2003). There has also been an increase in the number of individual education programmes within regular institutions from 12 during the period of 1994-95 to 3,171 in 2006-2007, while the number of schools with disability programmes increased slightly, from 54 to 68. This small increase came about as a result of a division of multi-level schooling methods (Al-Mousa, 2010). However, inclusion in Saudi Arabia differs from that in other countries, such as the United States, as Saudi Arabia has two types of inclusion. The first type is where students with disabilities participate in 50% of mainstream classroom teaching and receive special education services in resource rooms the rest of the time. In this type of inclusion, students with disabilities are expected to learn the same general curriculum of education with modifications and accommodations (Bender, 2013).

The other type of inclusion in Saudi Arabia is partial inclusion. This is intended for students with special needs, such as deaf and blind students and those with intellectual disabilities, or even autism. In this type, those with disabilities are always taught in a private room that is self-contained within the regular classroom compound and are allowed to participate with SNSEN in non-curricular activities such as physical education and art (Ministry of Education, 2002). However, those with mild intellectual disabilities as well as those with high functioning autism can participate in some academic activities in the regular classroom (Ministry of Education, 2008; Al-Mousa, 2010). In contrast, blind and deaf pupils and those with a severe intellectual disability can only participate in the non-academic classes within mainstream classrooms (Bray et al., 2016).

It is emphasised in the literature that the use of appropriate teaching strategies for all students, including SID, is one of the factors that should be taken into account when

implementing inclusion in the mainstream classroom (NCERI, 1994; Brady and Woolfson, 2008; Allison, 2012; Crabtree, Ashencaen and Williams, 2010). However, in mainstream schools in Saudi Arabia, there is no unified strategy for the teaching of SID and SNSEN students in inclusive classrooms (Alhammad, 2017), because the teachers use a strategy of lecture, discussion and demonstration with SNSEN (Bandura, 1977). In asserting that teachers deploy lecture-based tactics, discussions, and demonstrations when dealing with normal apprentices, Bandura (1977) meant that inclusion learning milieus should be based on similar approaches. This means that instructors dealing with inclusion environments should be able to use strategies that are specifically tailored to help each student understand lectures, by incorporating demonstrative tactics as well as discussion-oriented strategies to enhance learning experiences for both normal and special needs students. While, with SID, an individual teaching strategy and a peer training strategy are generally used (Vygotsky, 1978). Hence, the absence of appropriate strategies for teaching SID and SNSEN simultaneously is an obstacle to inclusion. Therefore, researchers emphasise that teachers should not depend on a single teaching method, but should use several that take into consideration students' different needs in order to improve learning for all students (Rose and Howley, 2007; Huang, 2007).

Teachers use assessment to measure students' progress. Assessment can be either formative or summative (Harlen, 2007). In Saudi Arabia, formative assessment is employed to assess all students, both SNSEN and SID, in mainstream schools, and is on-going assessment (Ministry of Education, 2014). Thus, teachers try to assist all students to acquire knowledge and pass tests without focusing on students' shortcomings (Alhammad, 2017). However, the problem with this type of assessment is that the knowledge to be acquired in general education does not take into consideration the abilities of SID. Hence, they may limit the ability of SID to learn what is appropriate for them, and thus decrease their participation in the mainstream classroom (Alhammad, 2017). Therefore, the implementation of an appropriate assessment method that takes into consideration the differences between students is a factor that supports inclusion (UNESCO, 2005; Mitchell, 2005; Mittler, 2000; NCERI, 1994 in the US).

The meaning of "Transitional Programme" in the context of mainstream Saudi schools was previously explained in §1.3.4. When looking at the transition programme, most studies conclude that the poor quality of the programmes is perceived to be a barrier to subsequent community inclusion and independent living. Based on these present researchers own

experience as a teacher and researcher, it is difficult to find an educational strategy or system that will enable individuals with special needs to be taught in the same classes as SNSEN in Saudi Arabian schools. This is due to the lack of research on the training of teachers to find a suitable way to integrate special needs students. Alnahdi (2015) identifies this issue as a research problem and shows that, in comparison with applied research in other related fields, only a few studies have focused on the adoption of instructional strategies to train SID for vocational success. Due to this, the focus of the current study is on professional skills.

However, the issues involved in the implementation of inclusion in Saudi Arabia are still not clear. Alhammad (2017) found a number of problems in the inclusion of students with special education needs in mainstream schools in Saudi Arabia. His study explored the problems of inclusion for SID in five mainstream primary schools and undertook interviews with 13 special education teachers and 11 general education teachers. The results showed that the majority of teachers understood the term “inclusion”, but that the curriculum, teaching strategies, assessment methods, number of students in the classroom and infrastructure presented obstacles to implementing inclusion.

In light of the above, previous studies have confirmed that there are problems including SID students in mainstream schools in Saud Arabia. One of these problems is the lack of a unified strategy for the concurrent delivery and evaluation of students with SID and SNSEN. Therefore, this present study seeks to develop a teaching strategy that consists of more than one method of teaching and evaluation for SID students taught with SNSEN. This strategy is UDL, which offers the flexibility for all learners to be taken into account in the curriculum (Rapp, 2014). UDL is defined as “a set of principles for curriculum development that gives all individuals equal opportunities to learn” (National Center of Universal Design for Learning, 2017). The following section gives further details on UDL.

KSA problems that impact on the inclusion of intellectual disability students in mainstream schools emanate from the fact that KSA does not guarantee that these students will be in a position to enhance their conceptual, practical, and social skills (Anderson, 2017). This is because the entrenched approaches are not sufficing to deal with the deficits that these students exhibit when it comes to self-determination and confidence. In the opinion of Ahsan and Sharma (2018), these KSA problems have hindered enhancement of intellectually disabled apprentices in mainstream milieus, because the strategies embodied have failed to

produce the anticipated echelons of improvements in as far as problem-solving and choice making is concerned.

2.3.9 The UDL on the inclusion of SID with SNSEN

Many studies have shown that UDL supports the inclusion of non-special education students and students with intellectual disabilities (SID) in learning academic skills. For example, as mentioned in the previous section, Kennedy et al. (2014) found that SID and SNSEN made significant improvement in terms of curriculum-based measurement and scored significantly higher on the post-tests when taught using a content acquisition podcast (CAP) program. Further, a study by Spooner, Baker, Harris, Ahlgrim-Delzell and Browder (2007) aimed to discover the impact of training in UDL on lesson plan development of teachers who work with SID and general educators in a college classroom environment. Experimental group design with a control group was used for this study. A one-hour teacher training session introduced UDL to the experimental group, while the control group received the intervention later. The results showed differences between pre-test and post-test measures for both groups (control and experimental) for special education and general education teachers. In addition, the results suggest that a simple introduction to UDL can help teachers to design a lesson plan accessible to all students.

Coyne, Pisha, Dalto, Zeph and Smith (2012) report that recent research suggests that SID benefit from high-quality instruction that includes comprehension and reading. This study examined the effect of a technology-based UDL approach to literacy instruction, called Literacy by Design (LBD), on the reading achievement of 16 students with significant intellectual disabilities with their non-special educational needs' peers in Grades K–2. The LBD approach emphasises reading for meaning, combining UDL-scaffolded e-books and letter and word recognition software. Nine teachers received training in research-based literacy practices. Of these, five received LBD training and implemented it four to five times weekly. Controlling for initial reading achievement, the LBD group made significantly greater gains on the Woodcock-Johnson Test of Achievement III Passage Comprehension subtest.

In addition, the findings of the Lee, Soukup, Little and Wehmeyer (2008) study indicated that access of both students and teachers to the general education curriculum can be facilitated by using UDL as a learning strategy. Furthermore, the findings of this study also suggest future practices and research that can be considered to enhance access to the general

education curriculum for students with disabilities. This study aimed to discover the variables of students and teachers that contribute to gaining access to the general education curriculum for SID. The students and teachers' variables were predicted on data concerning the access to the general education curriculum of nineteen students with SID, based on the observation for a total of 1,140 minutes. Multilevel regression analyses were employed to analyse the data. Although the results were in favour of UDL, one of the findings indicates that there is a complicated pattern in the relationship between students and teachers' variables, with interaction between these variables and environmental factors.

The results of previous studies (Spooner et al, 2007; Coyne, Pisha, Dalton, Zeph and Smith, 2012; Kennedy, Thomas, Meyer, Alves and Lloyd, 2014; Lee, Soukup, Little and Wehmeyer, 2008) strongly support the current study, because these studies focused on the inclusion of SID and non-SEN. Although the results of these studies indicated that UDL was helpful in improving the general curriculum, they did not focus on integrating SID and fostering full inclusion. Therefore, the current study will concentrate on integrating SID with non-SEN students such that they learn together in the same class.

The importance of these previous studies lies in the fact that some focused on teaching SID with non-SEN students with an even student distribution. For example, Coyne et al (2012) had eight students in an experimental group and eight students in a control group. The results are consistent because of the equal number of SID and non-SEN students. In other studies (Spooner et al., 2007; Kennedy et al., 2014; Lee et al., 2008), the distribution of students was uneven. For example, Spooner et al. (2007) distributed 72 non-SEN students and SID of various disabilities (mild, moderate, severe), and their age was not homogeneous. Meanwhile, Kennedy et al. (2014) distributed 109 non-SEN students and two SID at a secondary school. Also, in Lee et al's (2008) study, non-SEN students were combined with 17 students with SID and two students with autism. Thus, comparisons across groups and studies is problematic.

The second point to note is that all these studies agreed on the use of observations (both pre- and post-test) as a way of collecting data and ascertaining the effectiveness of UDL in education. Technology and smart devices were also used, such as Smart Boards, iPads, computers, the Internet, videos and multimedia. The UDL approach can foster practical skills because of the use of UDL-based technologies, such as computers, multimedia and smart blackboards. Many studies have emphasised the positive impact of these technologies on the

training of professional-vocational skills amongst SID (e.g. Tam and Cheng, 2005; Tardif-Williams et al., 2007; Westerberg and Klingberg, 2007; Schoenberg et al., 2008; Manheim et al., 2009; Kesler et al., 2011; Larson et al., 2016). Computers and multimedia can attract students' attention through the use of images, videos, short sentences and audio. These techniques also help students retain information in their long-term memory throughout repetitions (Larson et al., 2016). However, there may be obstacles to learning because of the teacher's inability to control the behaviour of students and because of possible software crashes (Alsalm, 2015).

The third point to note is how educational software used by UDL is designed. Two studies focus on this (Kennedy et al., 2014; Coyne et al., 2012). In each, the duration of training in how to use the program ranged from between 20 and 60 minutes for each lesson.

The fourth point to note is that most studies began to train teachers on how to use UDL and explain its principles (Spooner et al., 2007; Kennedy et al., 2014; Lee et al, 2008).

The review of the literature showed that little of the existing research on UDL conducted in the US involves children with intellectual disabilities, and focuses on teaching them academic skills such as reading and science (Spooner et al., 2007; Kennedy et al., 2014; Lee et al., 2008; Coyne et al., 2012). In contrast, there is a lack of evidence that the UDL works well with practical or professional skills such as photography. It is generally accepted that teaching academic skills is difficult, as the process concerns acquiring concepts rather than just skills, and that it is particularly problematic for SID. However, practical skills are easier to learn than concepts (Watson and Gable, 2010; Dweck, Walton and Cohen, 2014). With its multi-faceted approach, it seems that UDL has the flexibility to adapt to the individual learning needs of SID (CAST, 2015).

2.4 Opposition to the use of UDL

UDL has faced considerable opposition as this method of education focuses on precise development stages rather than continuous development (Bryant and Bryant, 2015). This could have negative consequences for the learners who require a slower process of development. In addition, with the UDL system of learning, there is considerable pressure during the preparation for students' participation in the standardised test (Dean, Lee-Post and Hapke, 2016). Such pressure can result in students' failure in cases where their results could have been different. According to Barrio and Hollingshead (2017), the standardised

tests taken by all the students are not differentiated. This could potentially affect the students' performance, or, even lead to stagnation in the education system. Webb and Hoover (2015) claim that education can become stressful, considering the evaluation of both students and teachers is based on the manner in which the students are able to read various passages and derive sense from them within a given time limit.

Shah (2012) reports that many US school districts are including universal design for learning, as this teaching method stresses the presentation of information in various ways. It also offers students many options to demonstrate their understanding. However, many leaders of education remain unsure as to the nature of UDL. State and district education leaders in the US have expressed their understanding of the significance of importance of UDL, and federal funds have been spent on putting UDL into operation. Shah (2012) reports that despite this, some of them are still not entirely certain exactly what UDL is.

Shah's (2012) study of 134 special education directors in 14 US states revealed that states and districts require greater information and support concerning how to put the principles of UDL into practice effectively. In addition, all the state district directors in the study stated that there were a number of obstacles to the implementation of UDL, such as the time required to implement it, limited funding, and staff shortages. The study found that one of the challenges of putting UDL into practice most frequently mentioned by the respondents was inadequate understanding. One respondent stated that teachers were often unsure where and how to start and if what they were doing was indeed UDL.

This means that UDL is not useful in every case. In particular, people with SEN need to be trained in a variety of ways. The results of the studies opposing the UDL method will help to avoid the problems we have seen in previous studies, including the length of time taken to prepare lessons and provide financial support prior to UDL implementation. This is due to the pressure of work of teachers when preparing teaching aids and preparing the teaching methods for students, such as shown in the study of Barrio and Hollingshead (2017).

2.5 The training of UDL with the teachers

Teacher training on inclusion programmes in Saudi Arabian education is lacking. It is necessary to find appropriate training programmes for teachers to assist students with special needs to integrate into education and society (Al-Mousa, 2010; Alquraini, 2010;

Bender, 2013; Afeafe, 2013; Ainscow, 2014; Al-Fazul, 2015; Al-Faiz, 2016). UDL is one of the training programmes that can help teachers achieve inclusion for special needs students, because one of the main features of UDL is the ability to utilise educational methods to meet the needs of individual students (CAST, 2015). Courey et al. (2013) confirmed that efficient lesson design with an all-inclusive outline for learning (UDL) enable instructors to meet all students' needs more adequately. In addition, Kurtts (2006) aimed to examine the implementation of the general education and training programmes by the teachers using UDL in dealing with all kinds of students. This study used quantitative research, with undergraduate pre-service teachers selected as respondents. They had been trained under general (five respondents) and special (three respondents) educational frameworks. The study provided in-depth findings related to the UDL format along with its significance in addressing the needs of disabled students.

Moreover, UDL attempts to overcome barriers students face in learning through investigating the three principles of UDL. Firstly, the use of varied means to present lessons, such as multimedia technology and smart boards, and connecting the information to computers so that the learners can see pictures and hear sounds. Secondly, there are various ways for students to express understanding of lessons through a list of tasks, which a student deems suitable. These can be expressed through the recorded voice, in written formats or demonstrated throughout practical application. Thirdly, students are given multiple options to increase their motivation to learn and help them integrate as individual learners or when learning in small groups. Electronic books are provided to those who prefer individual learning. Thus, the method is flexible to the individual needs and preferences of students. This opinion is supported by Thompson, Ribuffo, Wood and Browder (2014), who focused on teachers' preparations for the development of the UDL learning for SID. The study used qualitative methods to investigate the process accordingly. It focused on the analysis of various relevant studies and interviews with the research teams, as well as with 20 teachers participating in the preparation. The result of the study showed that the UDL approach has a positive impact on SID.

The studies of LaRocco and Wilken (2013) and Murray and Novak (2008) focused on training mainstream school and special education teachers in the UDL method, finding that the use of UDL improves the special education system. This study used a quantitative method and

involved 75 respondents. It focused on learning needs and guidelines for teachers to provide support and education to students with special needs.

According to Alkahtani (2013), UDL helps to increase the skills and knowledge of teachers after a training process in the use of UDL. The study focused on the requirement of UDL training programmes for teachers in the education process of disabled students. The study took a quantitative approach, using a questionnaire survey of 127 participants. In addition, interviews were also conducted with three participants. The responses showed that teachers' knowledge and skills of student's special needs had previously been inadequate.

Much has been written about the effects of UDL intervention on SID and SNSEN in terms of lesson plans and access to the general curriculum. The results of a number of studies indicate that UDL has the potential to operate effectively in the long term with these students (Vitelli, 2015; Lopes-Murphy, 2012; Evans et al., 2010; Murray and Novak, 2008; Spooner, Ahlgrim-Delzell, Harris, Baker and Browder, 2007). Finally, throughout their education, it is clear that each person learns in their own unique way. Therefore, UDL helps educators, students, and the community in embracing such differences with the help of different teaching techniques (Gargiulo and Metcalf, 2017). UDL helps educators to come together in creating different methods of teaching that have the ability to help every individual learner, no matter what their learning style (Meyer et al., 2014). It supports diverse teaching methods, thereby enabling students to gain the skills and knowledge they need to succeed (Organisation for Economic Co-operation and Development, 2008). Therefore, UDL helps educators and the community to identify the learning methods of each student, thereby giving opportunities to students that have similar learning methods, and offering support for their unique learning styles (Ralabate, 2011). Students are therefore recognised and appreciated for their learning methods instead of being pushed aside and considered low standard students. UDL enables teachers to incorporate many different learning styles in order to stimulate children's senses. In this manner, learners who learn hands-on are noticed and hence the lesson can involve each student (CAST, 2011). Finally, UDL helps teachers meet the challenge of serving all students, including those with special needs, while improving learning for all (CAST, 2011).

The results of previous studies focused on the training of teachers in the use of UDL. This informs the current study's emphasis on training special education teachers prior to the application of UDL. This is because teachers need to be explained the UDL principles and how to use technology to meet individual needs. Furthermore, quantitative data collection was

collected in most of the previous studies; Courey et al. (2013) trained 45 teachers in the use of UDL standards in lesson designs. In addition, Kurtts (2006) used quantitative research, with eight undergraduate pre-service teachers selected as participants. LaRocco and Wilken (2013) and Murray and Novak (2008) focused on training mainstream and special education teachers in the UDL method. This study used a quantitative method and involved 75 respondents. Alkahtani (2013) took a mixed approach (involving a questionnaire completed by 127 participants, and interviews conducted with three participants). Thompson, Ribuffo, Wood and Browder (2014) used qualitative methods with 20 teachers. The result of the study showed that the UDL approach has a positive impact on SID.

However, knowledge of the obstacles that teachers in the Saudi Arabian education context experience is lacking because of the dearth of research in this field. It is necessary to discover the barriers that teachers face when seeking to use UDL because, in Saudi Arabian schools, the special education teacher is responsible for the designing of lessons for vocational skills training, and chooses appropriate educational strategies based on the subject of a lesson and the capabilities of SID. For example, students can be taught photography skills in a practical way by providing a camera for each student's use. Individual achievement can be measured by the student's ability to take a photo. Despite the success of this method with some students, others may need the teacher's help due to cognitive problems, such as memory impairment, attention deficit and cognitive difficulties, among this student population (Turnbull, Turnbull and Wehmeyer, 2007). Moreover, there is a lack of teacher training in Saudi Arabia to deal with the challenging behaviour of SID in regular classrooms (Alfleaj, 2001).

2.6 Comparison between the design of the software used in the current study and other studies

Coyne et al.'s (2012) study is similar to the current study in that it designs educational software, using UDL to teach SID. This study focused on teaching reading skills, using e-books and letter and word recognition software to achieve this goal. The results of this study indicated the students of intellectual disability who were using the UDL program gained high scoer than the other groups who always use approaches in the classroom.

There are also some similarities between the software used in Coyne et al.'s (2012) study and the software used in the current study. First, both used stories and videos in the software to

help SID understand. Coyne et al. (2012) developed four universally designed digital storybooks, comprising two animal fantasies, one folktale, and one contemporary fiction work. The primary focus of these scaffolded e-books is comprehension, while they also address phonemic awareness, phonics instruction, vocabulary, and fluency. In the current study, five stories for SID and five for SNSEN were designed, based on students' abilities and guidance from teachers. In addition, the stories are incorporated into the video to be more interactive and use sounds and phonic stimuli. Second, read sounds were used to help SID students to navigate easily and give them guidelines in the software. Third, both software provided a set of interactive exercises or tests in different ways, for example written test, reading test, etc.

In addition, in both studies, software was embedded based on the three principles of UDL. The first of these principles is multiple means of representation: use of a digitised human voice to read the sentences, and highlighting animation. In addition, multimedia illustrations were used to enhance the story (e.g. click on the icons to hear the advice) and videos and photos were also used. The second is multiple means of engagement: during the stories and the students are given the option to take control by clicking on the mouse so that they are in charge of navigation, thus encouraging students to choose their responses. The option of audio-recording helps the students to record and then listen to their answers. The third is multiple means of action and expression: use of varied response tests for students (e.g. visual multiple choice, audio-recorded, sentence starters).

However, there are also differences between the software used in the Coyne et al. (2012) study and the software used in the current study. The main difference between them is their purpose. The current study's software was designed to teach SID the profession of photography, while Coyne et al.'s (2012) software was designed to teach SID reading skills through audio comprehension. Moreover, the materials or tools in the software differ. E-books and letter and word recognition software were used by Coyne et al. (2012), while multimedia and computers were used to apply the photographic software in this present study.

2.7 Conclusion

UDL in its broadest sense is associated with the US tradition (CAST, 2016), making it difficult to simply transfer into other cultures. While Saudi Arabia draws upon both curriculum content and educational policy from the US and UK, the context is clearly distinct. Moreover,

there is very little research to guide practitioners attempting to judge the transferability or generalisability of studies from the US context to Saudi Arabia.

Indeed, only two existing studies on UDL in the Saudi context exist (Alsalem, 2015). Alsalem focused on UDL by identifying the obstacles faced when using this method by teachers of those with hearing disabilities. Also, Alquraini and Rao's (2018b) study examined the challenges special education teachers faced when applying UDL in schools in KSA. Therefore, there is a need to study the effect of UDL on SID education, as well as understand the impact of UDL implementation on the teaching of academic and professional skills to SID in Saudi Arabia. In addition, there is a lack of knowledge regarding obstacles for teachers in the Saudi Arabian education context due to the dearth of research in this field. Therefore, it is likely that the implementation of UDL in Saudi Arabian schools will encounter difficulties. To the best of the researcher's knowledge, this study is the first experimental study conducted in Saudi Arabia at King Fahd Library (2015) (see appendix 1).

The current study will also benefit Saudi schools seeking to adopt the UDL method. In addition, the results of previous studies show that there is a lack of focus on the impact of UDL on the vocational training of the disabled, especially those who are mentally handicapped. This information will help teachers discover new ways to include students with special needs with SNSEN students. It will also facilitate the delivery of information to students with special needs in multiple ways. Finally, this study will add to and enrich a pilot study on UDL by Saudi researchers. Based on all of the above, the reviewed literature has allowed for the formulation of the three research questions that drive this study:

What is the effect of using UDL on the acquisition of professional photography skills in vocational programmes for SID?

Is the UDL an effective method for integrating female SID students with non-special educational needs female students in the same classroom, from teachers' perspective?

What are the advantages, drawbacks and challenges associated with the implementation of the UDL method in the classroom, from the perspective of observers and teachers?

The next chapter will illustrate the methodology used in this study, including the data collection and analysis tools adopted.

3 CHAPTER THREE: RESEARCH METHODOLOGY

The main aim of this methodology chapter is to set out the underlying principles and rationale for researching the effect of using the universal design for learning (UDL) to improve the quality of vocational programmes for students with intellectual disabilities (SID), and the challenges facing this method from the perspective of teachers. In particular, this chapter explains the approach taken and the methods selected to answer the research questions. The chapter begins with a discussion of the research paradigm and a general perspective of the methodological approach in research. It then explains both the quantitative and qualitative research designs used in this study, the sampling strategies and the measurement tools. The discussion also covers the changes that had to be made to conduct the research and a critical reflection on these changes. In order to describe the variety of research activities undertaken during this study, the data collection procedures are discussed alongside ethical issues. An overview of techniques for data analysis is also presented. The chapter concludes by discussing the rationale for the methods used and their limitations.

3.1 Research philosophy

Positivism was adopted as the paradigm for this research because it is most used in special education research and inclusion (Memisevic and Hodzic, 2011; Kurth and Keegan, 2014), also, the positivist paradigm shows opinions about the fact of information and the opposite opinions on the reality of research (King, 2012; Collis and Hussey, 2009; Maykut and Morehouse, 1994). Moreover, the positive paradigm applies in special education research and inclusion since positive knowledge depends on natural experiences, their relationships and properties which get interpreted through logical observation and reasoning, and the positive paradigm also helps in observing the relationships between special student's academic achievements and impacts of motivation and effects of intelligence (Kumar, 2019).

Thus, positivism was adopted as the paradigm for this research since it is mostly used in special education and inclusion of students who require special education. This research used positivism since it is a scientific research paradigm that investigates, confirms and predicts behavioural patterns. Positivism was also suited for this research since it involves experimental methods and application of pre- and post-tests. In addition, the concept of the

positivist paradigm is based on that there are facts and knowledge is objective (Sale, Lohfeld and Brazil, 2002). In the current study, the first fact is recording the results of the learning for SID and SNSEN students' photography skill when using UDL through observations and without the intervention of the researcher. Also, I gather teachers' opinions using questionnaires and open-questions about the effectiveness of inclusion after using UDL with students and learning about the obstacles to applying this strategy.

Moreover, researchers have favoured the positivist paradigm associated with quantitative research (Usher, 1996; Lodico, Spaulding and Voegtle, 2006; Bryman and Bell, 2003; Trochim and Donnelly, 2007; Brooks, 1997). The positive paradigm follows the idea that the only trustworthy knowledge is that which is gained through observation, including measurement (Dillon and Wals, 2016). In the research, the researcher's role is limited to interpretation and data collection in an objective manner (Wolgemuth, Erdil-Moody, Opsal, Cross, Kaanta, Dickmann and Colomer, 2015). For this, the positive paradigm related to quantitative research is favoured. This paradigm relies on experimental observations that lead to numerical analyses. Guidelines for positivism in philosophy research state that a researcher assumes there are no major variations in the logic of inquiry across diverse sciences.

Research based on the positive paradigm is aimed at explaining and predicting occurrences. Quantitative research, applied alongside this paradigm helps in quantification of issues through generation of numerical data that can be changed into applicable statistics (Ballard, 2018). The positive paradigm helps researchers to empirically observe the statistics through human senses. It then uses inductive reasoning to generate hypotheses to be tested later during the research process. Combination of the two approaches is also favoured by the researchers because it enables them to use common sense without biasing research findings. Therefore, in the present study, observation lists were used as a study tool, and a mixed approach was used to confirm the results.

In the positivist paradigm, through practical aspect, the researcher's goal is to test the validity of a research hypothesis, without any interaction from the researcher (Anderson, 1998). For Instance, in the study conducted by Zoniou-Sideri and Vlachou (2006) which aimed to discover teachers' views about inclusion in classes or schools for students with special education, they have used a questionnaire to discover these opinions without any impact from the researchers and the participants. In addition, these researchers examined the effect

of a few characteristics of participants on their beliefs, such as degree and years of experience.

To obtain a better understanding of why and how the methodological approach used in this study was chosen it is important to consider the underlying ontological, epistemological and methodological positions underpinning the work. Crotty (1998, p. 10) defined ontology as "the study of being…concerned with 'what is', with the nature of existence, with the structure of reality as such". Burrell and Morgan (1979) noted that the positivist ontological perspective is objective, due to its realist philosophical stance. Furthermore, this approach uses objective variables in order to verify certain sets of hypotheses (Crotty, 1998). Unlike the positivist/scientific paradigm, interpretivism “looks for culturally derived and historically situated interpretations of the social life-world” (Crotty, 1998, p. 67). The paradigm is based on an epistemological and ontological position that assumes that “reality is dependent on the meanings of people in the society, and such socially constructed reality is ungoverned by any natural laws, causal or otherwise” (Guba and Lincoln, 1994, p. 86). This means that this study focuses on the reality of inclusion in mainstream schools in the Saudi context. Moreover, it explores the appropriateness of using UDL as a way to include students with SID and SNSEN in the same learning activities. In addition, the obstacles facing the application of UDL will also be investigated.

Epistemology is central to any research endeavour (Cohen, Manion and Morrison, 2007) and can be defined as “a way of understanding and explaining how we know what we know” (Crotty, 1998, p. 9). In educational research, there are three main epistemological paradigms: positivist, interpretive and critical (Cohen, Manion and Morrison, 2013).

Parvaiz, Mufti and Wahab (2016) argue that most theories, including positivism, realism, interpretivism and critical theory, are linked to ontological assumptions about the nature of the world we are investigating and our views about its materiality and the generality of representation through previous theoretical. In addition, these types of theories depend on the results of previous studies in order to generalize the results of empirical research. In Saudi Arabia, most research adopts a positivistic paradigm, although a handful of studies rely on interpretivist positions, particular in educational research (Al-Kahtani, 2015). The most important of these Saudi studies in the field of special education are based on a positivist and interpretive paradigm and use quasi-experimental, qualitative and quantitative designs (notably, Al-Kahtani, 2015; AL-quraini, 2011; Battal, 2016). This is one of the reasons that the

researcher used a positivist paradigm in this study because there are a huge number of studies that use the positivist paradigm. In the following, the reasons why the positivist paradigm is used is explained.

In addition, selecting a methodology for positivism relies on facts, numbers and information derived from the study tools. Therefore, the role of the researcher becomes independent of the phenomenon that is being researched. Thus, the researcher avoids subjectivity in the research processes (Parvaiz, Mufti and Wahab, 2016). The advantage of these theories is that the researchers can maintain the worth of the status quo that is being investigated. However, the researcher views everything as inadequate and incomplete and feels immediate need for change, though they are not always in a position to engender the required change (Laughlin, 2004).

Moreover, the positivist approach uses deductive reasoning and aims to prove often well-established theories by employing primary data analysis in the research. The positivism emphasises the objective, law-like properties of a brute reality independent of observation (Donaldson, 2009; Wicks and Freeman, 1998). This approach is applied to learning in classrooms using the principles of UDL in the correct way. These principles are; representation, expression and activity - in order to measure the results of this method on students' performance objectively. Whereas, anti-positivism emphasises the creative role of active, subjective participants, none of whom owns a privileged claim on truth (Burrell and Morgan, 1979; Astley, 1985). Based on the above, in this study, the positivist paradigm will help us to understand the effect of UDL on the teaching of photography skills to SID and SNSEN students. It will also allow us to interpret ideas about the inclusion of SID with SNSEN in a way that avoids interventions by the researcher. The data collection needs to be objective, because schools in Saudi Arabia are currently interested in inclusion. The idea may be socially dominant amongst teachers at this time (Alhammad, 2017). Therefore, in the current study, positivism has been used to discover and explain the issues faced by UDL and the extent to which it is appropriate to include teachers' views about the obstacles, features, and disadvantages of this method.

Finally, there are various types of mixed methods paradigms. The current research follows the positivism approach because this approach is consistent with the questions asked in this study. For example, the first question necessitates the use of both qualitative and quantitative methods, including pre- and post-test and observation forms to measure the

extent to which students learn the skill of photography. These techniques are used to detect the impact of UDL on students with SID and SNSEN taking photography classes. The second question necessitates the use of qualitative data collection methods – including open questions to uncover the effect UDL has on the relative inclusion of SNSEN and SID students in the same class. Above all, in order to learn the benefits and barriers that result from the use of UDL from the perspective of teachers in secondary mainstream schools, we need to use quantitative and qualitative methods to collect information from questionnaires and open-ended questions. Thus, the positivist approach was used to answer the questions of the study.

3.1.1 Justifying the use of mixed method in this research

Mixed methods research is defined as research that collects and analyses data, integrates the findings into the study and draws inferences using both qualitative and quantitative techniques in a single study (Creswell, 2014). However, in a historical review, Mayoh and Onwuegbuzie (2015) find that specialists have given nineteen definitions of mixed methods in the field. On the whole, authors conclude that mixed methods research involves a combination of qualitative and quantitative methods and stands as a third research paradigm in itself (Mayoh and Onwuegbuzie, 2015).

Mixed methods are essential in the field of special education, since they offer particular value for researchers seeking to solve problems in the field of education or social studies (Teddlie and Tashakkori, 2002.p13: stated from Tashakkori and Teddlie,2010). One of the problems that arise in quantitative and qualitative research is that, sometimes, the researcher may need to use a variety of different methods. For example, first, quantitative and qualitative research may be needed to analyse the data and when the researcher finds himself needing to explain the results. In this case, qualitative research allows the researcher to reveal the relationships between variables. However, qualitative techniques are often weak when it comes to explaining the reasons for those relationships, thereby requiring the use of a qualitative study to explain the factors and causes of broader relationships. Thus, mixed approaches can help bridge the gap between quantity and quality researches.

Moreover, mixed methods can be used to answer questions that could not be answered using any other approach. Most researchers use mixed methods to enrich their ability to understand and address the problems they face in their field of study (Tashakkori and

Teddlie, 2010). However, the use of mixed methods does pose difficulties. The first is because of differences in paradigmatic background and the practicality of implementing combined methods (Mayoh and Onwuegbuzie, 2015; Happ, Dabbs, Tate, Hricik and Erlen, 2006; Creswell, 2014). Nevertheless, mixing both qualitative and quantitative methods does not necessarily mean mixing paradigms (Mayoh and Onwuegbuzie, 2015; Johnson, Onwuegbuzie, de Waal, Stefurak and Hildebrand, 2016). Thus, mixed methods are one of the methods which are used with experimental research, because it allows us to rationalise any combined procedure and demonstrate why such a combination of methods is appropriate in the context of a certain study and how it is to be implemented. In other words, the feasibility of any proposed research approach, whether using a single or mixed method design, depends on its suitability to the research questions being asked and on what type of data can be produced (Mayoh and Onwuegbuzie, 2015; Robson, 2002; Creswell, 2014). Where in this study, the research questions included a quantitative element in which student outcomes were documented using pre- and post-tests to rate their behaviour and learning outcomes using SID and students with non-special educational needs (SNSEN). The study also included a qualitative element to identify teachers' perceptions and beliefs about vocational training and the UDL method.

Mixed methods research can combine the individual strengths and practical benefits of the methods used while overcoming the possible inadequacies of each approach when used on their own (Johnson et al., 2016; Creswell, 2014). Thus, combining the two types can result in a productive, holistic, objective and complementary approach; this cannot be achieved if a single research method is used (Mayoh and Onwuegbuzie, 2015; Johnson et al., 2016; Brannen, 2005; Happ et al., 2006; Dunning, Williams, Abonyi and Crooks, 2008). Moreover, the inclusion of the two types of method can inform theory and practice relating to a particular research question; hence, data analysis goes beyond understanding the meaning of numbers or words in isolation from each other (Mayoh and Onwuegbuzie, 2015; Bryman, 2006). Therefore, in this study the researcher selected this approach in order to allow for cohesive and sound academic research, and as researchers are required to support the use of mixed method with some form of methodological paradigm that aligns with its ontological and epistemological underpinnings (Parvaiz et al, 2016). Quantitative data will be collected to study SID and SNSEN students using pre- and post-tests. The quantitative results will be supported by qualitative data, which will be collected from observation lists, in order to find out the impact of UDL on students' education in respect of SID and SNSEN photography skill.

In addition, the questionnaire will help to collect quantitative data on teachers' opinions about obstacles, disadvantages and advantages of using UDL. These results are supported by qualitative data derived from open questions.

On the other hand, there is some research that that has used the mixed method with UDL in the special education field. Also, this study drew inspiration from the most important applications of this approach (notably Marino et al, 2014; Hall et al., 2015). Those researchers use UDL and technology to learn more about students with learning disabilities.

Therefore, from the above we can see that it is clear that there is a gap in the field of special education research because there is limited work that uses mixed methods. Therefore, in this study, this gap will be bridged by the use of mixed approaches.

The present study used a mixed methods approach involving both quantitative and qualitative data in order to answer the research questions posed. Therefore, the study required more than a single tool to collect and analyse the results. Therefore, it is necessary to use mixed methods in order to collect both quantitative and qualitative data and enhance the research findings. However, it is important to understand the benefits and drawbacks of using the UDL approach from the perspective of teachers, as well as to understand the impact of the UDL programme on students' performance and SID training. In the following, the rationale for using mixed methods will be explained.

Figure 2: Illustration of the emphasis of the mixed approach in the current study

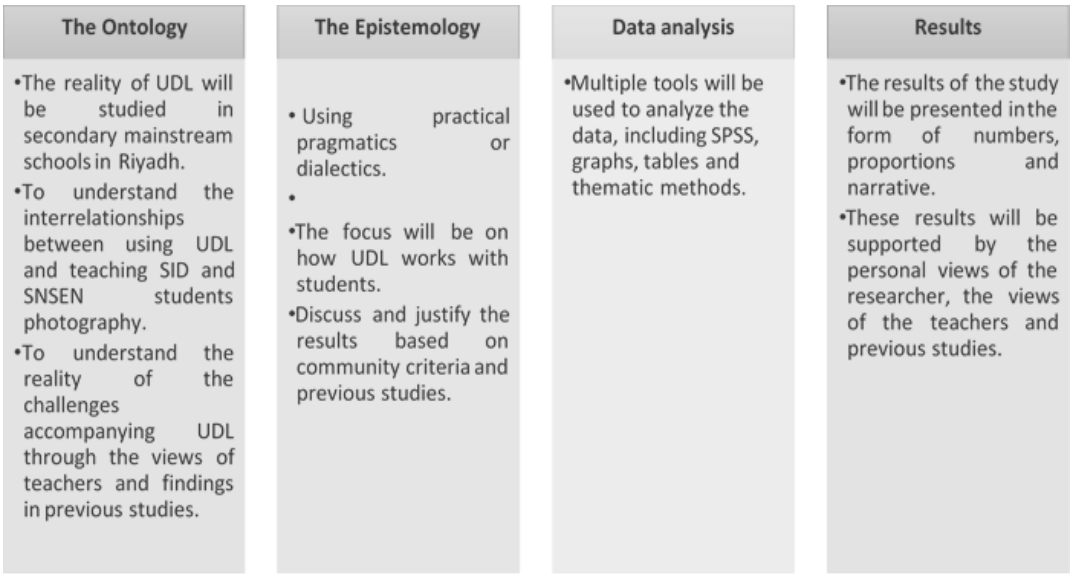


Figure 2 illustrates the ontological and epistemological underpinnings of this research and how they relate to the mixed methods design used in this study.

The study focuses on the use of UDL with SID and SNSEN students in secondary mainstream schools in Riyadh. It collected quantitative and qualitative data to compare outcomes in student performance before and after using UDL. It also compared the results of the experimental group with a control group, and collected quantitative and qualitative data in order to learn the interrelationships between the use of UDL on SID and SNSEN students studying photography. In line with the large number of studies that focus on the use of UDL on students with SID, the current study has used observation lists, pre- and post-tests to collect information that can be used to detect the impact of UDL in the education of SID and SNSEN students studying photography (Coyne et al., 2012; Kennedy et al., 2014; Hall et al., 2015; Marino et al., 2014; Vesel and Robillard, 2013; Katz, 2013; Webb and Hoover, 2015; Courey et al., 2013; Spooner et al., 2007; Katz, 2014). Doing so will allow us to understand the reality of the obstacles facing teachers when applying the UDL by tapping into the views of teachers, supported by previous studies.

In order to better understand the benefits and constraints of applying UDL in this study, a questionnaire was used to collect quantitative data. Studies have confirmed the importance of using a questionnaire to gather as much information as possible about the challenges

facing UDL in special education schools (Katz, 2014; Vitelli, 2015; Courey et al., 2013; Evans et al., 2010; Webb and Hoover, 2015). Since structured questionnaire studies produce quantitative data, the findings cannot provide details that explain the underlying causes (Robson, 2002). In order to produce an in-depth understanding of these findings, a qualitative component was subsequently conducted by using open-ended questions with a questionnaire (Kennedy et al., 2014; King-Sears et al., 2014; Vitelli, 2015; Katz, 2014) .

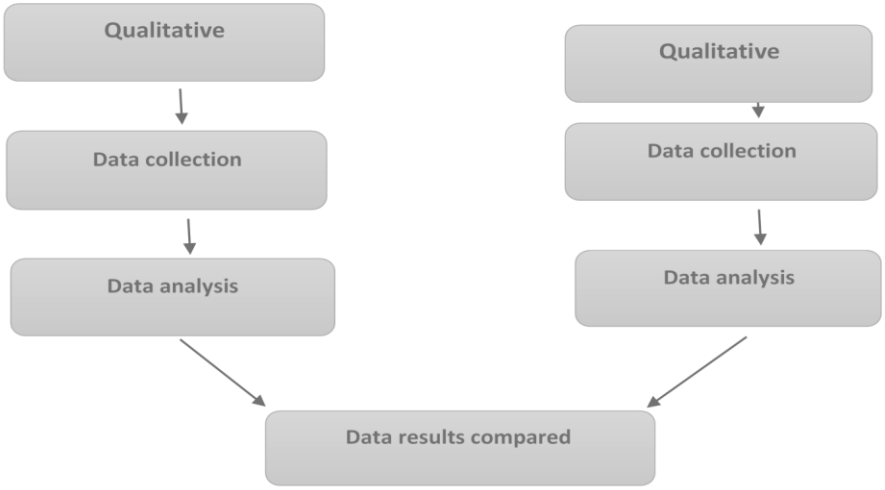
The study used positivism to understand the impact of UDL on the performance of students. Through the pre- and post-tests, the achievement of students before and after the application of UDL is calculated. In addition, the questionnaire calculates the frequency of the answers provided by teachers regarding the advantages, disadvantages and obstacles associated with applying UDL.

In the next section, the practical steps involved in the use of mixed methods will be discussed to understand how to apply the technique in practice.

3.1.2 Procedural considerations in using the mixed methods approach

The current research adopts a concurrent triangulation design. Figure 3 shows the concurrent triangulation design for the data collection and analysis techniques used in this research. In this design, qualitative and quantitative data are collected concurrently in one phase. The data are analysed separately and then compared and/or combined (Creswell and Clark, 2011). This method is used to cross-validate or corroborate findings. It is often used to overcome a weakness in one method with the strengths of another. It can also be useful in expanding quantitative data through the collection of open-ended qualitative data (Creswell and Clark, 2011).

Figure 3: The concurrent triangulation design (Creswell and Clark, 2007)



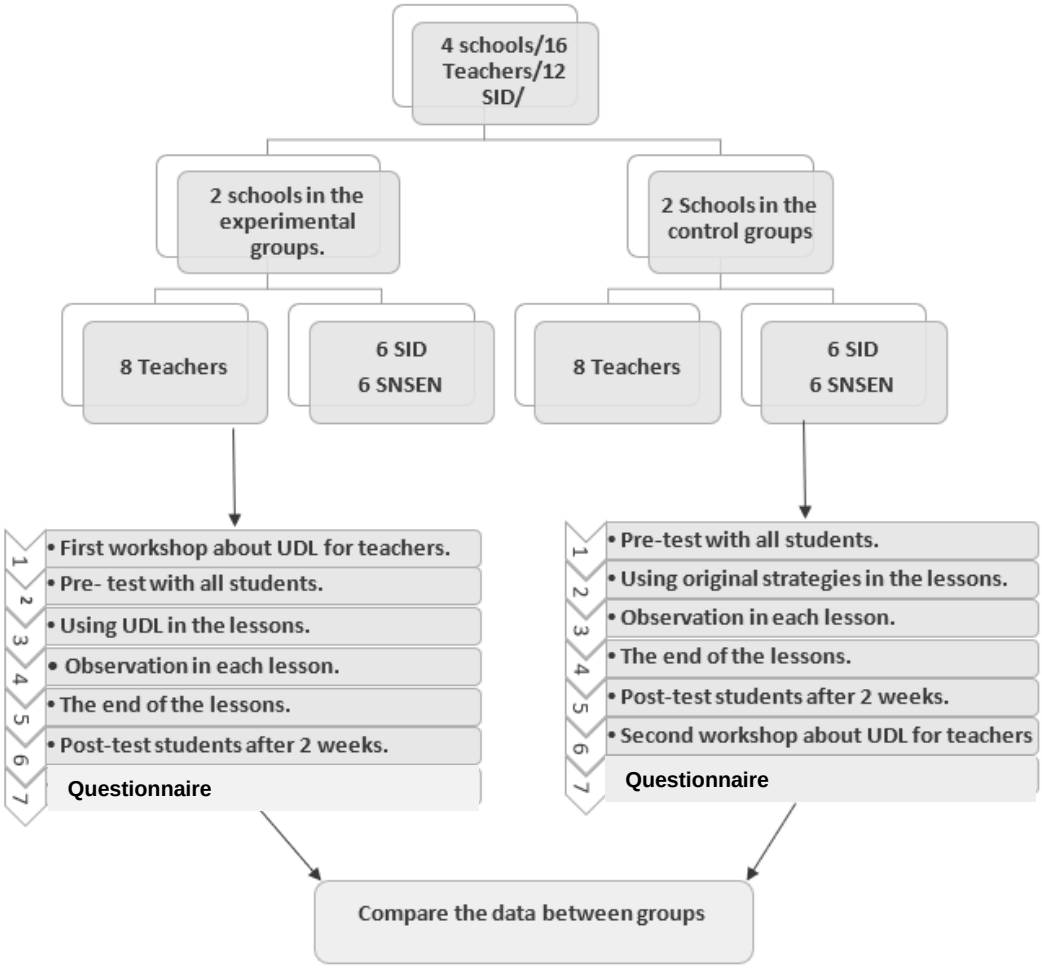
The current study was conducted pre- and post-test with 12 SID and 12 SNSEN students. Also, we applied a questionnaire to 16 teachers of special education working in mainstream high schools in Saudi Arabia, to collect quantitative data on the impact of UDL use with students and to collect information on the benefits and barriers to using this strategy in Saudi Arabian schools. Moreover, we collected qualitative data using observation lists for the students and open-ended questions for the teachers. The goal of the quantitative part was to explore preferences of the participants, while the role of the qualitative part was to explain these findings. Thus, when the details of the sequential design were considered at the planning stage of this research, it was decided that the qualitative data gathering would not commence until the preliminary results of the questionnaires, observation lists, and pre- and post-tests were obtained (Ivankova, Creswell and Stick, 2006). The preliminary findings of the cross-sectional study then formed the basis for constructing the topic guide for the qualitative phase. The results of the two phases will be integrated when discussing the research findings.

3.2 Study procedures and methodology

In this study, the mixed methods approach was used to help to evaluate the UDL method for vocational training. The methodologies comprised a before/after controlled trial of the UDL method, with SID and SNSEN forming the intervention group and comparison/control group,

respectively. The use of a comparison/control group allowed the researcher to evaluate the relative effectiveness of the UDL programme in impacting SID and SNSEN performance and training. Figure 4 explains the study steps.

Figure 4: The study steps



To answer the study questions and realize the study objectives we must first define the target population, the sample of the study from schools, teachers and students. The following steps were conducted.

3.2.1 Target population

The target population for this study comprised female teachers and female SID and SNSEN in mainstream female-only schools. Female schools were selected because, in Saudi Arabia, female schools and male schools are separated, and females cannot enter male schools. The objective was to identify ways to make special education a success in Riyadh in Saudi Arabia.

According to statistics released by the Special Education Ministry in Riyadh, Riyadh is home to nine mainstream schools, each of which has ten SID. Furthermore, the total number of teachers is 37 who teach SID in mainstream schools.

Of the nine mainstream schools in Riyadh, four were selected using a purposive sampling method. These four schools were chosen because they contain all the required criteria of application. These criteria were: choosing schools which have computer rooms, mainstream classes and a sufficient number of SID. In addition, the students, parents, teachers and managers in each of the four schools were in approval of this study. After schools were chosen, they were divided randomly into two groups using the lottery method. This involved placing the names of the schools in four closed envelopes, then selecting two to be the experimental group and two to be the control group. After the participating schools were selected, four teachers were chosen from each school, for a total of sixteen teachers from all schools. The following will explain more about how I chose the teachers. The participants, therefore, comprised:

1) Teachers who work with SID, in control and experimental groups

2) SID

3) SNSEN

3.2.2 Sampling procedure and sample size

The selection of the study sample took place in three stages.

1. Teachers: In each school, there are two mainstream classes and five special education teachers. There were a total of 20 teachers, with the names of all the teachers who agreed to participate in the study being recorded. Four were excluded, for several reasons, including withdrawal, rejection of working, and maternity leave. The remaining teachers were distributed into the control and experimental groups using a random sampling approach. The lottery method was used to distribute teachers in order to avoid bias. Four teachers were selected for the experimental classes and four for the control classes. This yielded a sample of four teachers from each school, for a total of sixteen teachers from all schools. In addition, all participants were teachers who were teaching photography skills to both SID and SNSEN and who were familiar with the necessary technologies and software Programmes. The selection process outcome is illustrated in the following Table 1.

Table ١:Distribution of the teachers at the schools

GROUPS		NO. OF TEACHERS	
		PARTICIPATING TEACHERS	Teachers did not take part
School 1	Experimental Group 1	4	٢
School 2	Experimental Group 2	4	١
School 3	Control Group 1	٤	١
School 4	Control Group 2	٤	٠
TOTAL	4 GROUPS	١٦	٤

2. Female SID: The student participants in this study were selected from the group of SID studying in the four selected mainstream secondary schools in Riyadh using a random sampling approach, after a list of the 40 total female SID studying in the selected schools was compiled. The study excluded SID with motor impairments in the hands. Furthermore, the participants were all SID with IQs between 55 and 75, according to the Stanford-Binet and Wechsler SID scales, which are used to diagnose students in Saudi Arabia (Al-Kahtani, 2015). The IQ information was obtained from the SID's teachers, who had access to the students IQs through the school's student files. In addition, their degrees or results of tests for the last academic semester were obtained. Then, the degrees of the students were selected between 80-100. Also, the teachers chose the students who had an age of 15-16 years. This was in order to make the control and experimental groups similar in terms of age, degree and IQ. Table 2 shows the similarity of the two populations. Then, 12 female students were selected based on their teachers' nominations and the students' own interest in the project. After the students were selected, they were separated using the lottery method (which involved placing the names of the students in closed envelopes and drawing six names for the experimental group and six for the control group). First, each student was assigned a code (i.e. pseudonym or alphanumeric code). Next, six codes were selected to participate in the control group, and the remaining codes were assigned to the experimental group.

Table 2: Illustration of the similarity of the two groups

SID in Exponential group								SID in Control group						
NO	١	٢	٣	٤	٥	٦	**Average**	٧	٨	٩	١٠	١١	١٢	**Average**
IQ	70	60	71	65	70	60	**٦٦**	٧٠	٦٠	٦٠	٦٥	٧٠	٦٥	**٦٥**
Age	١٦	١٦	15	١٥	16	16	**١٥,٥**	15	16	15	١٥	16	16	**١٥,٥**
Degree	٨٠	90	٨٥	٨٠	٨٦	٨٨	**٨٤٪**	٩٠	٨٠	٨٩	٩٠	٨٥	٨٠	**٨٥٪**

3. SNSEN: The SNSEN participants in this study were selected from the four mainstream secondary schools in Riyadh. Those four schools have six classrooms and 60 female students in each school for the secondary stage, giving the total of 240 students. The number of SNSEN students in the photography class depends on their desire to choose the activity each time. For example, in one class there are 30 students. It is possible to choose 5 students to participate in the cooking activity, 11 students in the sewing activity and finally, 14 others in the photography activity. So, 12 students were selected, who each offered consent to participate in the study and learn photography skills.

A total of 12 SNSEN students were selected from the 240 students. There were an equal number of SID students. This is more helpful for when we are not wanting to focus on SNSEN students but instead on SID students and vice versa, than if the number of SID is larger. Also, it is possible that the increase in the number of students is a factor that negatively or positively affects the results of the study. The main objective of the study is to learn the effect of UDL on the development of students. The use of a new strategy (UDL) in Saudi Arabia for the first time requires a small number of students before a larger sample can be taken, so that researchers and teachers can master the use of this strategy. The names of the female students were recorded in a list. Then, 12 female students were selected using systematic sampling according to the following rule: "first identify the needed sample size. Then, divide the total number of the population with the sample size to obtain the sampling fraction. The sampling fraction is then used as the constant difference between subjects" (Mugenda, 2011; Systematic Sampling, 2017). Following this approach, the researcher divided the total of 60 SNSEN students by the required sample size of 12 so that it was identical with the SID sample. When dividing 60 students by 12 students, the output is 20. Therefore, students are arranged

in a list from 1 to 240. The name of the 1st student is taken and, after 20 students, then take the name of the 21st student, and so on until you have 12 students in total.

Following this selection, the 12 female students were separated into two groups: six in the experimental group and six in the control group. They were divided in the same way as the students in the SID group. Thus, the final sample comprised a control group of six SID and six SNSEN and an experimental group of six SID and six SNSEN. In total, 24 SID and SNSEN participated, as shown in Table٣ .

Table٣: Distribution of the students at the schools

GROUPS		No. of students	
		SID	SNSEN
School 1	**Experimental Group 1**	3	3
School 2	**Experimental Group 2**	3	3
School 3	**Control Group 1**	3	3
School 4	**Control Group 2**	3	3
TOTAL	**4 GROUPS**	١٢	١٢

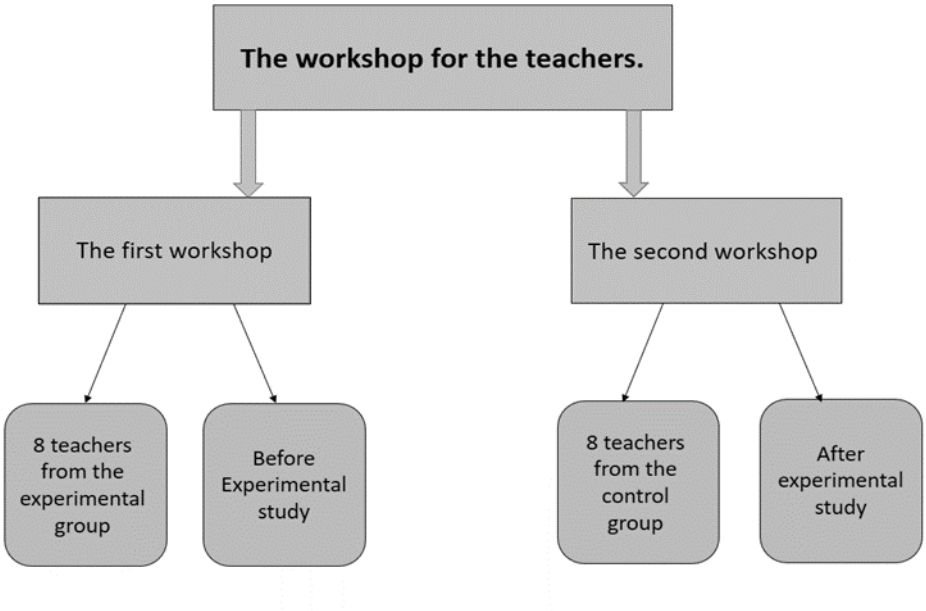
So as to be a similar sample, the SNSEN sample was confirmed to be of the same age and academic achievement as the SID sample, as shown in Table٤ :

Table٤ : Illustration of the similarity of the two groups

SNSEN in Experimental group								**SNSEN in Control group**						
NO	١	٢	٣	٤	٥	٦	**Average**	٧	٨	٩	١٠	١١	١٢	**Average**
Age	15	15	15	15	15	16	١٥	16	15	15	16	15	15	١٥,٣
Degree	٩٥	90	٩٩	٩١	٩٣	٩٠	٪٩٣	٩٠	٩٨	٩٠	٩٥	٩٨	٩٤	٪٩٤

3.2.3 The workshop with the teachers

Figure 5: Division of the workshops



The first workshop: After the consent form for the study was reviewed and approved by the Ministry of Education in Saudi Arabia, I arranged a time and place for a UDL workshop, see more information about how the researcher picked the teachers (§ 3.2.2). Once the workshop was scheduled, I sent the data for the workshop to the special education supervisor, who, in turn, sent the data via email to the teachers participating in the workshop (see appendix 5 and 6 -Teacher Workshop Invitations).

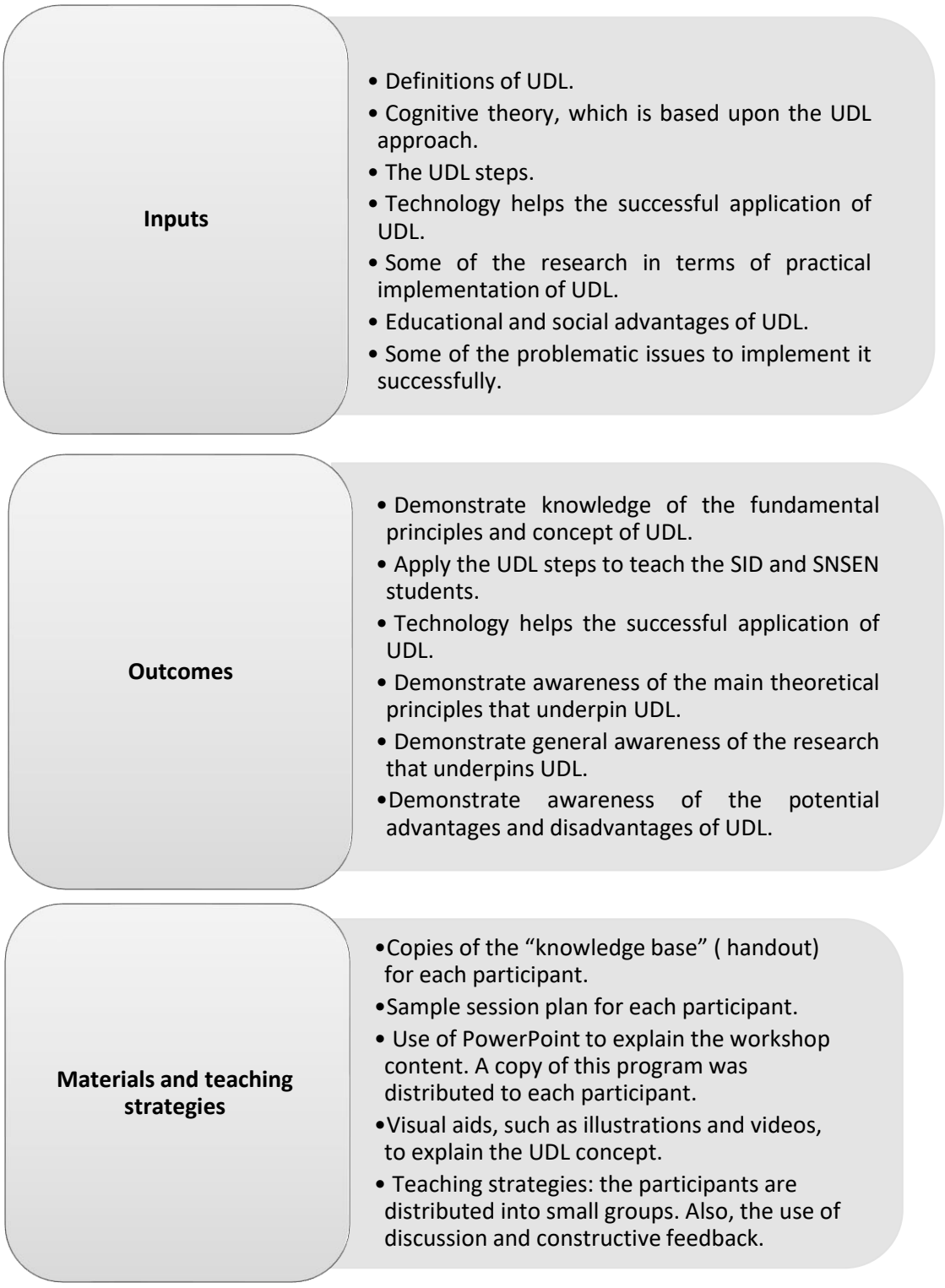
During this stage, the teachers were invited to attend a workshop titled "Universal Design for Learning" to help the researcher collate relevant data. This workshop was provided only for the teachers in the experimental group, and not for the teachers in the control group. The workshop lasted approximately four to six hours and was divided into two stages. At the beginning of the workshop, participants from the experimental group were given 15 minutes to complete an initial questionnaire (see appendix 13 and 14), which sought to gauge the teachers' knowledge about the UDL method before the concept was explained in the workshop. Second, the UDL method was presented. At the end of the workshop, the teachers prepared tools for a photography lesson based on the UDL approach. Furthermore, during the workshop, the teaching staff were told about their roles when teaching the female

students in terms of applying the study and the pre-test and post-test and observing the students along with the researcher (see Figure 5: Division of the workshop***.***

The Second workshop: A second workshop was conducted following the completion of the application of the study, this time for the teachers of the control group. At the beginning and end of the workshop, the control group participants were given 15 minutes to complete the questionnaire. The objective was to compare the perceptions of the control group teachers with those of the teachers from the experimental group. The workshop also sought to explore the difficulties encountered during the implementation and to build knowledge about teachers' perceptions concerning the integration of SID with SNSEN in mainstream classrooms.

Training the teachers to use UDL: In the current study, teachers who work with SID have been trained on how to apply UDL in teaching these students with their peers. Also, the current study depended on a number of previous studies that support teacher training on how to use UDL before starting to teach students (CAST, 2015; Courey et al., 2013; Thompson et al., 2014; LaRocco and Wilken, 2013; Murray and Novak, 2008; Alkahtani, 2013; Coyne et al.,2012). A workshop entitled "The universal design for learning (UDL)" was held at the Lecture Hall at one of the mainstream high schools. The overall aim of this workshop was to provide trainee teachers a comprehensive, introductory overview of UDL method, as well as the opportunity to learn the steps for applying the UDL, and knowledge of technological means that help the success of the application of this method. As well as this, the workshop aimed to address the teaching of the SID and SNSEN students together at the same time. The workshop also helped participants understand some of the research regarding the practical implementations of the UDL. Finally, it helped participants identify the advantages of the UDL and the problems related to its successful implementation, as shown in *Figure 6* (see appendix 35 The time table of workshop).

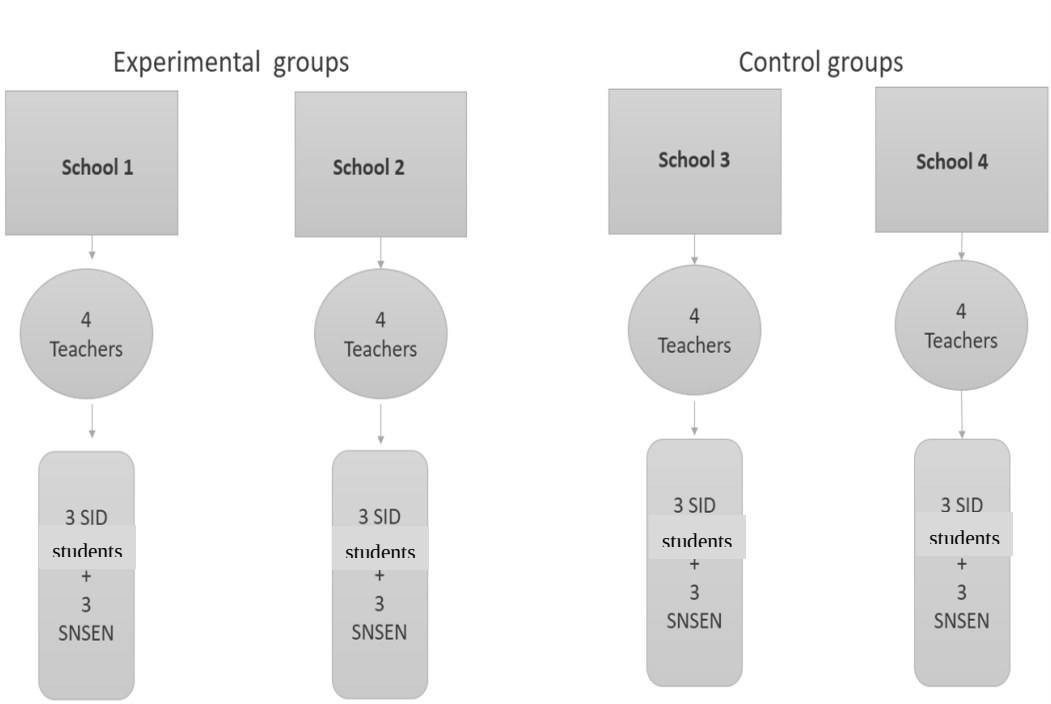
Figure 6: Explanation of the inputs, outcome, the materials and teaching strategies for the workshop of teachers training (CAST, 2015; Alkahtani, 2013; Coyne et al., 2012).



3.2.4 Experiment with students

The group was divided into two, pre- and post-test, to measure how teaching the vocational programme with the SID was undertaken. The SID and SNSEN students were separated, such that six female students participated in the experimental group (i.e. the group trained using the UDL) and the other six female students participated in the control group (i.e. the group that received training via the original programme). The two groups were trained simultaneously for a whole academic term. The researcher and teacher were responsible for designing the UDL programme lessons to teach photography career skills to all SID and SNSEN in the experimental study. Furthermore, the researcher acted as an observer during the classroom sessions. *Figure 7* shows the distribution of experimental and control schools as well as displaying the number of students and teachers.

Figure 7: The design of the study



3.2.5 Steps of intervention

The number of students altogether in these classes is 24 (12 SID and 12 SNSEN). Also, to achieve consistency between the schools, the number of SID and SNSEN students and teachers has been standardised across the classes. Students used the software as a basic tool

to explain and measure student performance and unify the lessons for all teachers. Finally, this study distributed teachers' tasks precisely.

The workload for the four teachers in each group was as follows. First, the teachers met to agree on the learning design and how to evaluate the SID and SNSEN students. Then, each teacher was responsible for explaining the title of the lesson every day. Also, the rest of the teachers assisted the main teacher in the follow-up and supervision of students, where each teacher was responsible for assisting with the education provision within one of the corners of the divided classroom.

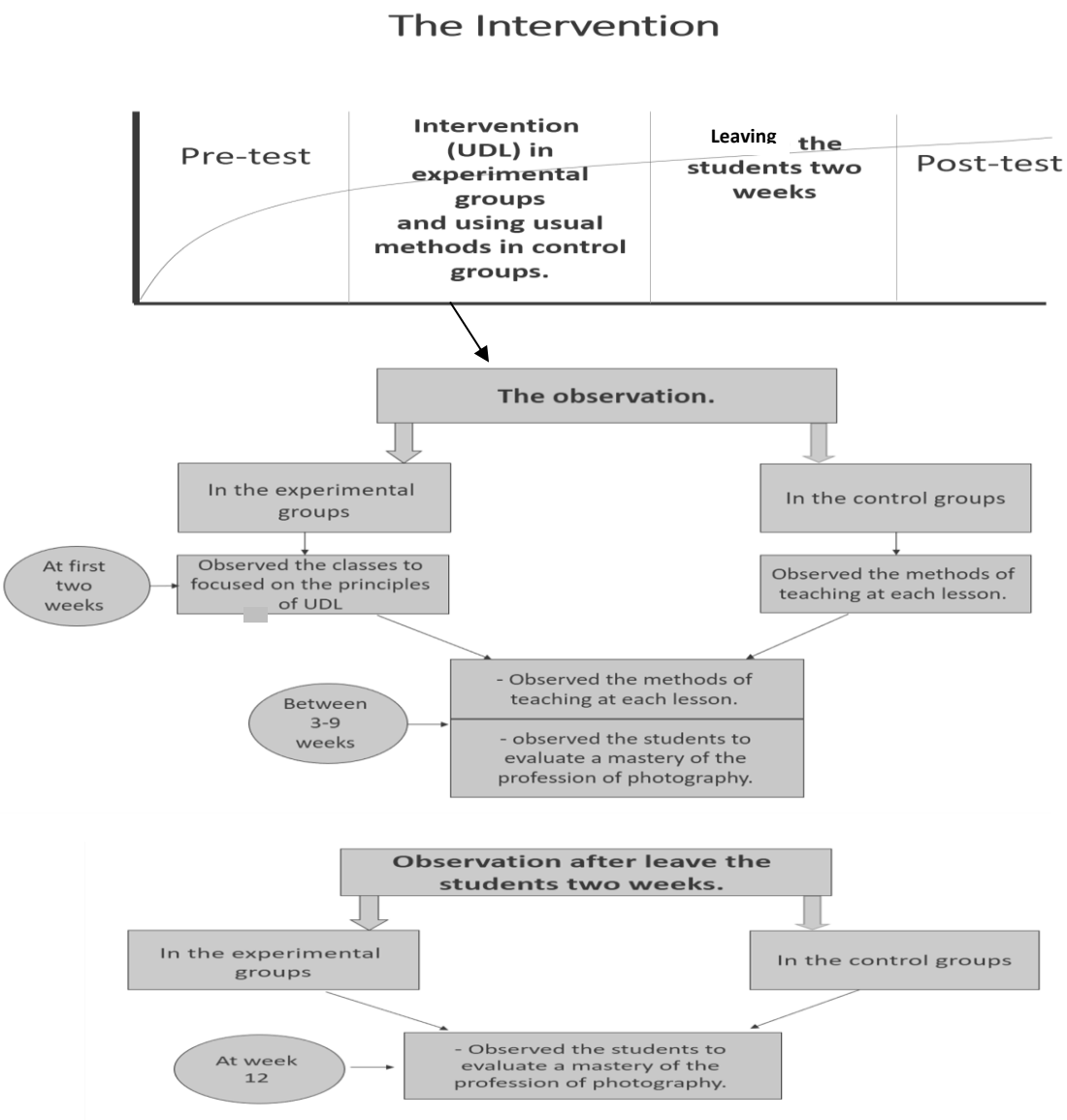
To confirm that the eight teachers in the experimental group would all 'buy in' to the UDL to the same extent, I set up a workshop to train the teachers on how to use UDL before starting the experiment. Also, there was an observation list undertaken weekly by the researcher to observe the extent to which teachers understood UDL, and so the teachers received guidance each week. All teachers were trained to the same degree to understand UDL.

SID and SNSEN students were tested in all groups (experimental and control). The pre-test was used in this test to measure all students' ability to take A4 photographs. The test consisted of verbal questions and practical questions, such as asking the student to turn on the camera and take a picture (see appendix 25 and 26). Then, when the test was marked for the students, it was found that most students had failed in their photography skills. There were also a few students who had a little information about the camera and photographic skills but had not passed the test. From the following week, the intervention was conducted on the experimental and control groups at the same time for seven weeks, where the experimental group received lessons on photography learning by using the UDL method, whereas the control group received the same photography lessons but by using the usual methods provided by teachers. Figure 8 demonstrates the steps of the intervention of this study.

During the application of photography instruction classes for students, the researcher observed the classes once a week for three months for approximately 30 to 45 minutes per session. The observation occurred across three stages. The first stage comprised the first two weeks of the application experience. It focused on the principles of UDL, following an observation list that was used to help measure the steps of the UDL (see appendix 19 - Observation List Concerning the Principles of the UDL). During the second stage, which took place after the first two weeks, the researcher measured the extent to which the objectives

of the lesson were applied using a list of observational targets (see appendix 21- List of Observations of Objectives). During the third phase, in weeks eight and nine, the researcher observed the students' photography skills. During the weeks 10 and 11, the students took a two-week break from photography skill training. Finally, during week 12, the students were again evaluated with respect to their mastery of photography based on the post-test (see appendix 25 - Pre- and Post-Test). The results of the experimental and control groups were then compared. After the SID experiment was applied, the second questionnaire was distributed to the teachers in the experimental group, who were given 15 minutes to complete the questionnaire. The objective was to record the teachers' opinions about the application of the UDL strategy in their schools. Thus, ultimately, the data used in this study were collected from the questionnaire, the pre- and post-tests, and the observation list.

Figure 8: Steps of the intervention of the study



3.2.6 Dividing the classroom into teaching areas for the experimental group

The researcher did not find previous studies which discussed dividing the classroom; in contrast, the previous studies focused on teaching SID and SNSEN. Therefore, the researcher relied on references and videos that helped to crystallize the idea of dividing the classroom in this way. These included those of Courey et al. (2013), Ralabate (2016), Alberta Education (2015), and National Center on Universal Design for Learning (2010). The classroom was arranged into teaching corners. The reason being is that it is the researcher's view that there is a huge discrepancy between SID and SNSEN capabilities, and so the corners help to distribute students according to their wishes and help to refine each student's informational needs. The teaching corners also help to mix SID and SNSEN students in a spontaneous way, thus each student chooses their favourite activity. For example, it is possible to choose two SID and two SNSEN students for the photography corner or, alternatively, one SID and one SNSEN for the reading corner. Arranging in this way means that all students are able to learn at the same time.

The classroom was divided to four learning corners based on the title of lessons, as shown in Figure 9. Those corners were: computer corner, reading corner, cards and puzzle corner and photographic corner. Table 5 explains the content and tools for the learning and evaluation of students.

Teachers designed teaching aids and activities based on UDL and each student's abilities. Then, the students were chosen where to go each day by selecting their favourite activity from the activities panel. This activities panel contained a description of all the activities in the class. Students moved within the classroom every 15 minutes to different activities, and all students cycled through all activities. If students never chose to go to one area, then this was down to the student’s choice, but the teacher should try and entice them and promote each activity. Also, if they all were to choose the same area, the teachers should respect their choice, but should tell the student that she must wait or choose another activity until other students have completed their work.

Figure 9: Dividing the classroom for the experimental group

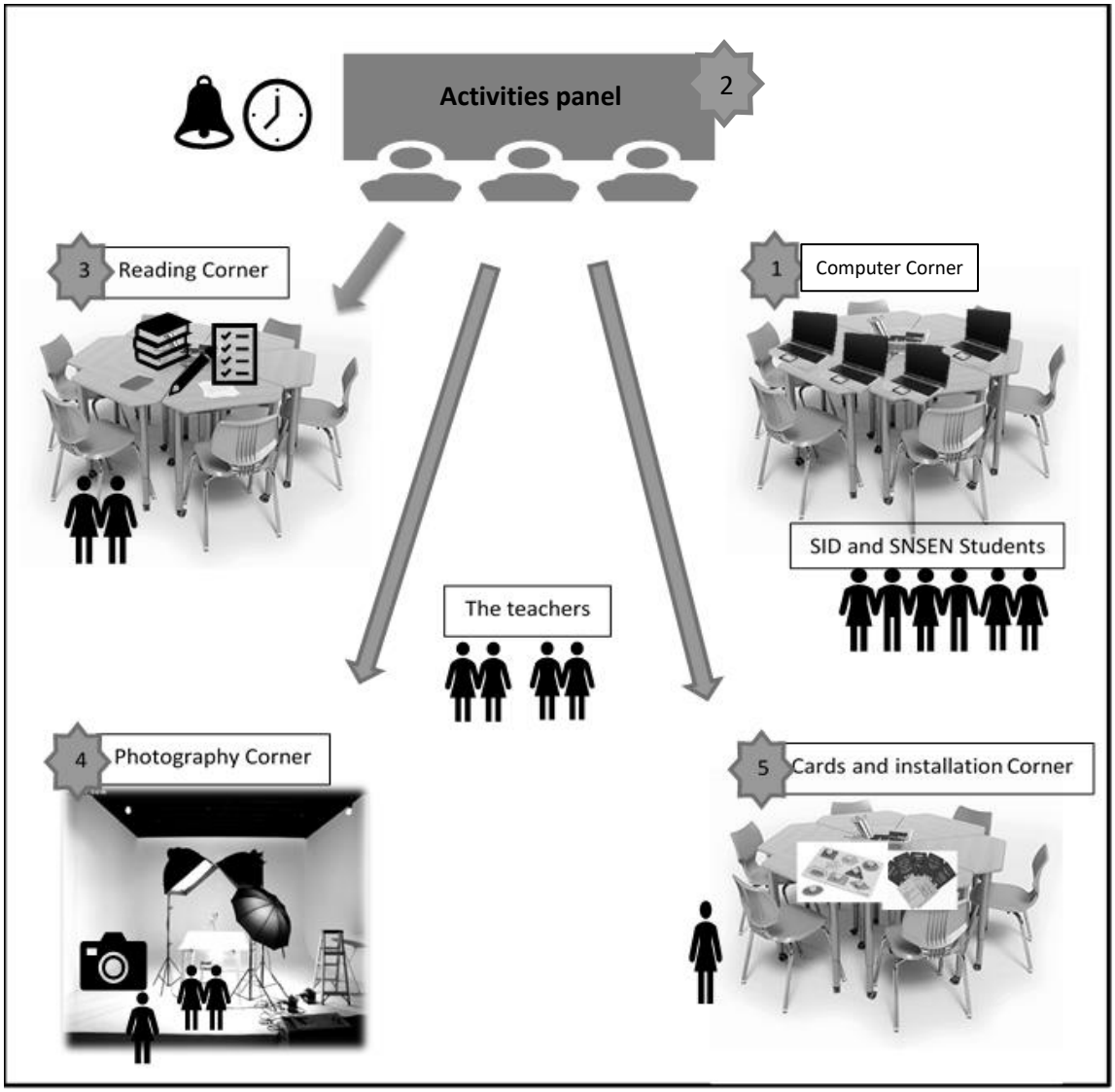


Table 5: The content or tools for learning and evaluation of students

Corners	Learning Tools	The methods used to explain the information to students	The evaluation approaches for students
Computer corner	Computers Software programmes	Using a story approach. Using learning by multimedia Programmes. Using illustrated images. Self-study.	Written evaluation by software. Voice evaluation by software. Multi-choice testing by software.
Photographic corner	Camera. Light. Printer. Printer papers. Camera holder. White cover.	Representation and Simulation. Teaching peers. Practical application of the task.	Take a picture with the camera correctly.
Cards and puzzle corner	Puzzle for each lesson. For example, create a puzzle for the parts of the camera. Designing the cards and images according to the lessons. Ipad to show the images. The Internet to research about photography and cameras. Brochures about photography and cameras. Magazines about cameras types, types of pictures and how to photograph.	Representation and Simulation. Teaching peers.	Installation puzzle. Papers tests. Arrange pictures sequentially, much like arranging the steps in photography. Mention the contents of the images
Reading corner	E-books about cameras. The Internet, to read about and research photography and cameras. Brochures about photography and cameras. Magazines to read about camera types, types of pictures and how to photograph.	Teaching peers. Self-study.	Repeat the information which the student has read. Answer questions by writing or recording the answer. Writing student opinions on social media such as Facebook, Instagram and Twitter.

The classroom also contained an activity panel, as shown in Figure 9. The purpose of this was to explain the activities in the educational corners in order to help the student move from one corner to another if that was what the student wanted. Beside this, there was a wall clock and a bell. These tools were there to help to organize the students' time so that each activity would take 10-15 minutes. When the bell is heard, the student was to move to the other corner, without being directed by the teacher. This panel was illustrated with simplified illustrations so that SID students could understand the contents.

3.2.7 Apply lessons in the experimental group

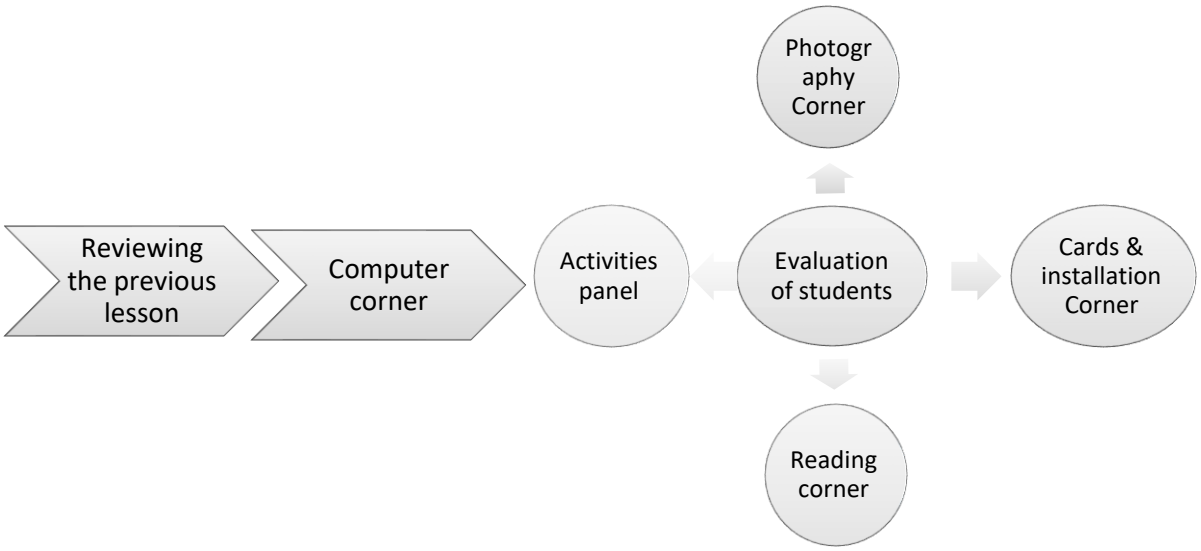
Teachers followed these steps to explain each photography lesson. Each lesson was to last 55 minutes and the teacher spent the first five minutes reviewing the previous lesson. The teacher then would then ask SID and SNSEN students to sit in the computer corner. In this corner, students would begin by using the educational software called "Learning to Photograph", and SID and SNSEN students opened their own respective parts. The program takes 15 minutes and presents information to the student and evaluates them in three different ways (see Figure 10).

It was likely that a number of SID and SNSEN students would choose the photography corner. In this corner, information was to be exchanged between students through simulations and peer teaching. One example is where SNSEN students present the role of the photographer in front of SID students. Then, SID students imitate their peers and take photographs, meaning that the information is presented and evaluated by the students themselves in 10 minutes.

After hearing the bell, the students would move to another corner. Let us assume that they would choose the cards and puzzle corner. In this corner, students would see images of the subject and a puzzle installation. Then SNSEN students would be assisted by their SID peers. This corner also takes 10 minutes, and included an information display and student evaluation. Finally, the students would again move after hearing the bell to the last corner, the reading corner, which takes an additional ten minutes. In this corner, students read information from papers, magazines, topics on iPads or E-book, the Internet and brochures. Teachers have designed reading tools that suit each category and reflect the students' abilities. Also, in this corner, SNSEN students explain the task to their peers from the SID. At the end of the session, the students were given homework, in which they were required to

write their views and exchange information on social media through, for example, Twitter, Facebook, WhatsApp or Instagram. They would send their assignments to the teacher via email. SID students need help from their teachers, colleagues or parents to use social media. hese students continue to communicate and send photos of tasks through WhatsApp to parents, brothers and SNSEN student friends.

Figure 10: Steps of photography lessons for the experimental group



3.2.8 Dividing the classroom into teaching areas for the control group

Teachers divided the classroom in the usual way, as shown in Figure 11. The classroom had 2 desks, the first desk was for SNSEN students and the other desk for SID students. Teachers believe that they will be more focused when they separate in this way. Table 6 below shows the tools and assessment methods used in the classroom to explain the lesson.

Figure 11: Dividing the classroom for the control group

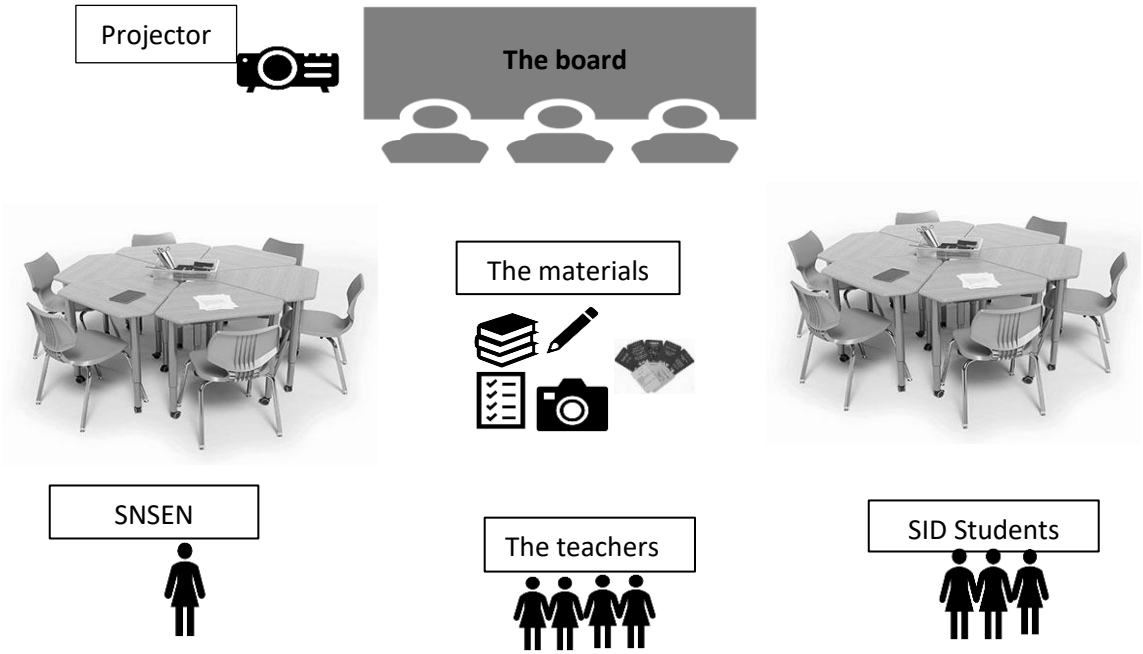


Table 6: The tools and assessment methods used in the classroom to explain the lesson

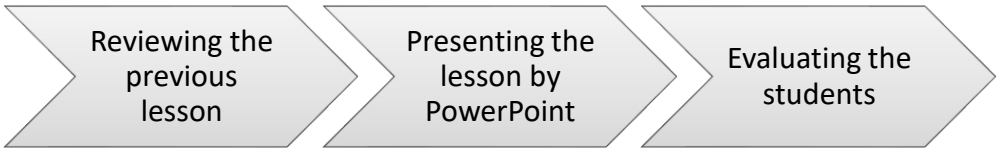
The learning tools	The methods used to explain the information for students	The evaluation approaches for students
- Projector for PowerPoint. - Camera. - A board. - Designing cards and images, in some lessons.	- Using a group presentation. - Using discussion and dialogue.	- Use standardized test sheets for all students. - In the last two lessons the practical application was used.

3.2.9 Applying the lesson in the control group

The teachers followed these steps for each photography lesson. The lesson lasted 55 minutes in total and the teacher spent the first five reviewing the previous lesson. Then, the lesson was presented in a collective way to all students by using PowerPoint. The content of the PowerPoint presentation was proportional to the level of the SID students, which led the

SNSEN students to become bored. The lesson took 35 minutes. In the last ten minutes of the session, the evaluation papers were distributed to all students. The teachers also distributed homework, to be delivered next time.

Figure 12: The steps used in the photography lessons for the control group



3.2.10 The role of the teacher in this study

- Attend a workshop on the UDL.

- Deliver a photography lesson to SID and SNSEN.

- Collaborate with the researcher to prepare tools for the UDL lesson.

- Assist the researcher in selecting female students for the experimental group.

- Distribute the pre- and post-tests to SID and SNSEN.

- Participate and cooperate with the researcher in observing the outcomes of learning for the SID and SNSEN using the observation list.

3.3 Data collection methods

The data collection took place from March to June of 2017. Upon receiving permission from the University of Strathclyde to carry out the study, the researcher collected data using the following methods. Pre-test / Post-test

3.3.1 Quantitative data stage:

Pre-test / Post-test: Pre- and post-tests were used to measure the improvements in the students' performance relating to photography skills. Pre and post-test are a quasi-experiment in which participants are reviewed ahead of and after the investigational operation, as depicted by Flick (2013). To make sure the pre- and post-tests were fair, the items of the pre-test and post-test were the same. Similarly, the examining teachers and the

researcher applied the tests in similar conditions during the pre-test and post-test, such as using similar tools, teacher and class selected in the pre-test. To guarantee the stability of information, the researcher applied the test two weeks after the study application. The researcher also accompanied the teacher in assessing research results in pre- and post-tests. Finally, the tests consisted of questions and phrases that were short and clear for the students. Because of the objective items, researchers should select different responses or words and short phrases to complete statements (Padilla-Diaz, 2015). They lay down concrete data that can be scored simply and evaluated by employing statistical procedures. One of the advantages of the pre- and post-test approach is that it allowed for the comparison of more than one participant and can expand to comprise more than a single dealing. Despite these advantages, there are a number of disadvantages, such as the pre- and post-test cannot measure immediately the participant's reaction to the effects of the experiment. Moreover, it presumes that groups are the same due to random assignments (Flick, 2013). This defect or problem did not affect the current study because the researcher used the daily observation lists to support the results and ascertain the outcome of each student.

In this study we used the pre- and post-test because it is a helpful diagnostic tool for teaching in a more effective manner with special education students. Silverman (2010) stated that a pre-test gives the teacher an idea of the weak and the strong students in class and checks their improvement on the post-test. In addition, it identifies the topics that students are aware of and those topics that the students do not know (Vogt, Gardiner and Haeffele, 2012). When the pre-test and post-test are compared, a higher post-test score shows that a student has learned a topic. On the other hand, if the post-test score is lower than the pre-test it indicates that a topic was not learnt in the course.

There are many studies that used the pre- and post-test to detect the impact of UDL on the education of people with special needs in general, and the intellectually disabled in particular, such as: Coyne et al. (2012); Kennedy et al. (2014); Hall et al. (2015); Marino et al. (2014); Vesel and Robillard (2013); Katz (2013); King-Sears et al. (2014); Miller and Lang (2016); Webb and Hoover (2015); Courey et al. (2013); Spooner et al. (2007); and Katz (2014). All those studies encourage the researcher to choose the pre- and post-test as tools to answer the study questions.

Pre- and post-tests were used to measure the improvements in the SID and SNSEN students' performance relating to photography skills in four mainstream secondary schools. The researcher prepared this tool after presenting it to four teacher reviewers. The tool was then distributed to the members of the study sample. Finally, the completed tests were collected, sorted and analysed (see appendix -Pre- and Post-test 25, 26). The researcher designed the pre- and post-tests as photography tests in a way that matched the culture of Saudi Arabia. The tests focused on photo-taking standards (A4), which are used in the passport and ID card industries, as well as on image clarity, quality, and light effects. Also, attendance at the Diploma in Photography Webinar Series at Shaw Academy helped the researcher to create the pre- and post-tests (Shaw Academy, 2016).

The study used pre- and post-tests for both SID and SNSEN. The test comprised two parts. In the first part, the students gave their answers orally. The second part tested the students' application of photography as a practical skill. The aim of the pre-test was to help the researcher identify and select individuals who required photography skill training. The post-test aimed to assess the SID and SNSEN's mastery of photography skills. Specifically, it aimed to answer the following question: Is the student now qualified to practice photography as a profession?

3.5.1.1 Reliability of the tool: Immediate response is one of the advantages of written and oral parts of tests for the students (Singh, 2015). However, some students may have felt intimidated during the face to face interactions. It is easy for students to get confused by interpersonal signals during face to face encounters. Writing can be a complex craft for some students who find it tiring, especially due to the originality requirement (Walliman, 2017). Therefore, in this study, the test relied on the oral test for the first half and a practical test for the second. For the fairness of results, students who find difficulties with oral tests would complete practical tests. Similarly, students who undergo difficulties with the practical test would take oral tests.

To determine statistical validity of pre-tests and post-tests in a practical way, the researcher can use a Mann-Whitney U test to check whether the mean significantly fluctuates from the hypothesized value.

The pre- and post-tests were applied to a sample of 24 students. The test's stability was calculated using Cronbach's alpha with a stability coefficient of 0.5, by use of the SPSS programme. Cronbach's alpha is used to measure internal consistency, as explained by (Paul

Gerrard, 2015). It is a reliability test which is used to discover if variables comprise of items that are constant with each other. It is a scale that represents a single dimension or construct. Therefore, when using pre-post-test measurement, we must ensure there are no changes and calculate numerous Cronbach's alpha scores for each time the scale is used (Paul Gerrard, 2015). Cronbach's alpha is easy to apply by use of the SPSS programme, which calculates the coefficient of discrimination for each question where the question of which the coefficient of discrimination is weak or negative is deleted.

Validity of the tool: Validity reflects whether a tool measures what it is designed to measure (Field, 2013; Pallant, 2001). The validity of the pre- and post-tests were determined by presenting the tests to four special education teacher reviewers. The teachers have modified some words that increase the reader's understanding of them, as shown in appendix 31, 32.

Questionnaire: Questionnaires, as explained by Bulmer (2004), are questions in printed or written forms, which are used to survey or conduct statistical studies, which are the collection of data that is analysed scientifically and objectively. In addition, questionnaires help to collect huge amounts of information in a short time, and does not need too high a cost to apply (Bulmer, 2004). The researcher chose to use a questionnaire to collect the study data because a questionnaire was the most expedient, direct, and cost-effective method available. Moreover, because special education teachers were busy with the students and interviews would take a long time, a questionnaire was used instead. The questionnaire enables the concurrent collection of information concerning the advantages, disadvantages and impediments to UDL. The primary study tool was the questionnaire form, which was based on a prior study conducted in the Saudi Arabian environment (Alsalem, 2015). This tool compiled teachers' views on the benefits and disadvantages of using the UDL method. Moreover, most studies have used questionnaires to discover the impact of UDL with special needs students, and to know the challenges facing this method in schools of special education (Marino et al., 2014; Vesel and Robillard, 2013; Katz, 2013; King-Sears et al., 2014; Smith and Harvey, 2014; Miller and Lang, 2016; Webb and Hoover, 2015; Evans et al., 2010; Courey et al., 2013; Vitelli, 2015; Katz, 2014).

The researcher added open questions at the end of the questionnaire. These questions were first provided to four teacher reviewers. After a review by these teachers, the results showed that they were able to understand all the items clearly, and only changed the category from

hearing disability to intellectual disability. Then, these questions were distributed to the study sample, and the responses collected, sorted, and analysed (see appendix 13, 14 and 16). The study used the first part from a questionnaire concerning UDL tests adapted from the work of Rose and Meyer (2002), the creators of the UDL concept (see appendix 13). The second part of the questionnaire is called "Concerns-Based Adoption Model (CBAM)" (see appendix 14). CBAM describes the concerns of teachers after their process of change, applying a new intervention, or adopting innovations that were previously unknown to them (Hall and Hord, 1987; Alsalem, 2015). CBAM includes seven stages. The first stage is awareness which is focused on the innovation. The second stage is to learn more information about the innovation. The third is more personally-specific, in terms of concerning how a person will use an innovation effect. Stage four refers to management: spending time in preparing the materials. The fifth stage relates to the consequences, with the focus being on how its use affects students. The sixth is collaboration and which concerns what co-workers are doing. Whilst the seventh and final stage is about refocusing: this stage collects ideas about how things could work even better (Hall, George and Rutherford, 1977). In this study, CBAM is used to identify the obstacles facing the UDL.

This questionnaire was modified and translated into Arabic by Al-Salem (2015), whose version has become a standard for the Saudi environment. The questionnaire comprises two parts. The first part focuses on the three principles of the UDL (i.e. engagement, representation, and action/expression) and seeks to measure the extent of participants' knowledge of the concept and steps of UDL. The second part seeks to identify the obstacles facing the UDL. At the end of the questionnaire, in the current research, the researcher has added open-ended questions to measure the strengths, weaknesses and future directions of teachers using the UDL (see appendix — English and Arabic Questionnaires 13 and 14).

However, there are some disadvantages to using a questionnaire. One of the drawbacks is a lack of validity and there is no way of telling if the respondent is being honest. Also, the respondent may not remember the whole situation or their answers, and people may misinterpret the questions. In addition, it asks for limited information. There is no measure to show how much thought the respondent has put in (Brace, 2008). In an attempt to decrease these defects, instances where the participant had not answered a question were removed from the SPSS programme. This reduced the error rate of the results. Validity and reliability were also extracted to confirm the reliability of the questionnaire items, as

explained below. To ascertain the answers of the participants, open-ended questions were used. This was to verify the credibility of the responses, and confirm that their answers were not random responses. For more information about the questionnaire administered, collected and the time teachers had to complete them, see the section on the first and second workshops (§ 3.2.5).

Reliability of the tool: The questionnaire was distributed to a sample of 16 teachers, and the stability of the test was calculated using Cronbach's alpha, as this is the most widely used tool to measure reliability. Stability refers to the (in)consistency of a scale: that is, whether a measure produces the same results if it is re-applied to the same sample. One of the most important methods of calculating stability involves using Cronbach's alpha coefficient. This coefficient takes values ranging from zero to one, where higher values reflect greater data consistency. Thus, a value of zero reflects a complete lack of consistency, and a value of one reflects complete consistency (Field, 2013; Pallant, 2013).

The researcher calculated the Cronbach's alphas through comparing all dimensions between the control and experimental group to measure the consistency of scores across items.

Table 7: Reliability of control and experimental groups

Variables	Items	Control Group N=8 α	Experimental Group N=8 A
The Engagement	9	0.73	0.71
The Representative	9	0.72	0.81
The Expression and Action	9	0.74	0.84
The barriers of UDL	9	0.66	0.75
Barriers: Understanding of UDL	15	0.9	0.75
Barriers Application UDL	35	0.75	0.70

Table 7 shows that all values of the Cronbach's alpha coefficients are higher than 0.7 in both groups, except the barrier's variables having reliability was 0.6 in the control group.

"For this survey, a five-point Likert-type scale was used for the instrument engagement, representation, action, and expression sections, and the barriers section, which is the

response options for this section, can be described as follows: 1= SD (Strongly Disagree), 2= D (Disagree), 3= N (Neutral), 4= A (Agree), and 5= SA (Strongly Agree)" (Al-Salem, 2015).

Validity of the tool: Cronbach's alpha can be used to test the validity of the tool (Cargan, 2007). The validity of the tool was calculated using the tool's stability because there is a strong correlation between test validity and test stability. Furthermore, the validity test is always constant. Thus, to determine the test validity, the following equation was applied: test validity = square root of test stability (Field, 2013). All validity values were higher than 0.5 for both the control and the experimental groups, except in the case of the barrier's variable, whose validity was 0.4 for the control group.

3.3.2 Qualitative data stage:

Observation: Observation is a study that observes the natural characteristics of a unit in its natural environment (Lynis and Breakwell, 2006). It involves observing something just as it is, and it is not controlled. Observation does not rely only on sight but also combines with other senses. It also states the other effects that could influence the results of a study.

The advantages of observation are that it assists to gain access to people in their actual life conditions, it is suitable for clarifying meaning and context and is effective for validity and thorough insight (Lynis and Breakwell, 2006). On the other hand, the disadvantages of observation are that it can be regarded as too subjective and takes up a lot of time, it might influence the setting thus influence findings, and ethical values may be breached. In addition, there is an elevated possibility for role disagreement for practitioner researchers (Vogt et al., 2012).

Observation is significant not only in the context of teaching and learning, but also for highlighting the real behaviours of learners acquainted with this form of knowledge. However, if participants are aware that they are being observed, their awareness may affect the information gathered. Thus, to draw useful observations, researchers must be inconspicuous and considerate of participants' needs (Lynis and Breakwell, 2006). Furthermore, with the help of checklists, researchers can address problems relating to record-keeping, the structure and format of the lessons delivered by the trainee teachers, the participants involved in the UDL procedure, the feedback provided by the students for the trainee practitioners, and the transparency and clarity of the instructions provided to the participants.

Bryman (2015) claims that observation is important for students with special needs because it helps in understanding the differences in capabilities and individual behaviours of students. It also helps improve teaching based on feedback acquired. This is what many studies have proven, there are similar studies relevant for the current study. These have used systematic observation to collect data about the impact of UDL on education for students with special needs, especially those with SID (Coyne et al., 2012; Wehmeyer, 2006; Kennedy et al., 2014; Hall et al, 2015; Marino et al., 2014; Vesel and Robillard, 2013; Katz, 2013; Smith and Harvey, 2014; Miller and Lang, 2016; Webb and Hoover, 2015; Rappolt-Schlichtmann and Daley, 2013; Evans et al., 2010; Courey et al., 2013; Spooner et al., 2007; Tsuchimoto, Mikawa and Okawa, 2003; Katz, 2014).

Through observation and checklists, researchers can determine whether the UDL lessons given in the classrooms are accurate and meaningful. It is important to note that an individual's actual actions are not always what they claim (Johnson and Turner, 2003). Thus, the researcher may wish to directly observe students' responses, as was done during the follow-up steps of the application programme. To ensure the reliability and authenticity of the data collected, a researcher must focus on completing checklists accurately. In the present study, while observing the delivered UDL programme, the researcher engaged in evaluative procedures to make decisions regarding which information to include and which to leave out (Silverman, 2006). An example of this was an evaluation of teachers' understanding of the principles of UDL and how to apply this method correctly with SID and SNSEN students. In this study, structured observation is used to measure improvements in the students' photography skill performance and ensure the principles and steps of UDL are applied correctly in a classroom. The structured observation has been used because it is very systematic and enables the researcher to generate numerical data from the observations (Cohen et al., 2013). Moreover, we used rating scales to collect the data from the students and teachers. The researcher observed the students' performance and measured their ability to photograph "A4" images for use in a passport. In addition, the researcher then observed once a week for three months for periods of 30 to 45 minutes per session over a total of 12 days. The observation took place in three phases, as indicated by three observation lists (see appendix 19 to 24) and, in the data analysis chapter, it will be further demonstrated how these lists were used.

In order to make the observations objective, an observing teacher was appointed. To minimize the researcher's effect on the participants, students and teachers were identified in five days by introducing the researcher and explaining the consent form.

Phase I: This phase took place during the first two weeks of the application experience. During this phase, the focus was on the principles of the UDL, and the researcher used an observation list to measure the steps of the UDL (see appendix — List of Observations of the Principles of the UDL 19 and 20).

Phase II: During this phase, which took place after the first two weeks, the researcher measured the extent to which the lesson objectives were applied using a list of observational targets (see appendix — List of Observations of Objectives 21 and 22).

Phase III: During weeks eight and nine, the researcher observed the students' photography skills. During weeks 10 and 11, the students took a two-week break from photography skill training. Finally, during week 12, the students were evaluated for a second time on their mastery of the profession of photography. Their mastery of the skill was measured against an observation list (see appendix — Observation List 23 and 24).

Reliability of the tool: The reliability of the tool is closely related to its validity. The reliability helps to set limits of validity. Reliability refers to the consistency of the tool (Silverman, 2010). However, ensuring reliability and validity in research can be difficult for a researcher while using observation; therefore, there was a teacher observing alongside the researcher so that similar results could be achieved and bias could be avoided. The researcher observed a sample of 24 students. The stability of the test was calculated using Cronbach's alpha by use of the SPSS programme with a stability coefficient of 0.5. This study calculated the reliability by using Cronbach's alpha in the SPSS programme, which calculates the coefficient of discrimination for each question where the question of which the coefficient of discrimination is weak or negative is deleted. In addition, the researcher presented it to four teacher reviewers to account for reliability.

Validity of the tool: Validity of the tool refers to the degree to which behaviours are accurately recorded from observations made by the researcher. The observation should be reliable and consistent to show validity. The data provided by different researchers in the same situation should be the same to show validity in the data. Validity reflects whether a tool measures what it is designed to measure (Field, 2013). To calculate the validity of the observations, this

tool was presented to four special education teacher reviewers. The teachers' feedback was presented on the observation list. The four teachers assessed the items on the list and checked the language, the meaning of the sentence and the relevance of the phrases and the content. In addition, unclear items agreed upon by most teachers were deleted or modified.

Open-ended questions: The open-ended questions included 11 questions that asked the teachers to provide more detail on aspects not covered by the main portion of the survey. These questions explored the teachers' perspectives on the possibility of using the UDL programme to teach female SID and female SNSEN in the same classroom. The questions also explored the advantages and drawbacks associated with the implementation of the UDL method in the classroom from the perspectives of both observers and teachers. The responses to the open-ended questions were analysed and coded via content analysis using a systematic text analysis involving themes and subthemes (Creswell, 2013). Content analysis is a methodological approach that involves turning text into coding categories (Hsieh and Shannon, 2005). Through content analysis, patterns, categories, and themes are identified and coded (Mayring, 2004). In order to establish the trustworthiness or the validity in qualitative research (Creswell, 2013), a member checking mechanism was used in respect of these questions (Guba and Lincoln, 1994).

The advantages of open-ended questions are that they allow unlimited answers and provide room for the respondent to say what they think about the question (Brace, 2008). The respondent can also expound on closed responses and give clarity. On the other hand, the disadvantages are that they are time-consuming and require more effort to get a response to the questions. Moreover, it may be difficult for the respondents to provide literal answers if they are not used to sharing their opinions (Bulmer, 2004). There is no control over how long the responses will be, and the coding required for the analysis may be expensive, difficult and time-consuming.

Open-ended questions are important to encourage the teachers to be active in class with students (Brace, 2008). Many studies have used open-ended questions to find out teachers' views on the challenges faced by the UDL application with special education students (Kennedy et al., 2014; King-Sears et al., 2014; Miller and Lang, 2016; Vitelli, 2015; Katz, 2014).

3.4 Data analysis procedures

A sequential explanatory design was used to answer and analyse the data for the questionnaire (see Figure 13). "This method is a two-phase design, where quantitative data is collected first followed by qualitative data collection. The purpose is to use the qualitative results to further explain and interpret the findings from the quantitative phase. For example, a survey may be used to collect quantitative data from a larger group. Members of that group may then later be selected for interviews where they can explain and offer insights into their survey answers" (Creswell and Clark, 2007). The advantages of conducting an explanatory design are that it consists of two phases, making application easier because the researcher conducts the two methods in separate phases and collects only one type of data at a time (Chen, 2009; Creswell and Clark, 2011). Thus, solo researchers can execute this design without the need of a research team. Moreover, this design focuses on quantitative data because it often begins with a strong quantitative orientation. In addition, one of the most important features of this design is that the search results and the final report are presented in a straightforward manner. Although the explanatory design is clear and accurate, this approach still brings with it challenges. Notably, this design requires a lengthy amount of time for implementing the two phases. Also, the researcher may find it difficult to make use of the same individual in both phases of the data collection. Thus, it can be difficult to secure internal review approval for this design because the researcher cannot specify how participants will be selected for the second phase until the initial findings are obtained (Creswell and Clark, 2011; Creswell, 2014; Johnson and Christensen, 2017).

Based on a sequential explanatory design, the quantitative data were collected using the questionnaire, observation lists and pre- and post-tests. These quantitative data were supported by qualitative data extracted from observation lists and open questions. Furthermore, a sequential explanatory design was used to validate the quantitative data model, as shown in Figure 14.

To explain the sequential explanatory design in more detail, the researcher first determined the status of each student. Then, the results of the SID students were compared to those of the SNSEN students. The results were then represented graphically using pie charts, graphs, and tables. Moreover, quantitative information from teachers was collected using a questionnaire. The teachers' results were then compared in the experimental group and the control group. Finally, qualitative information was collected and analysed to support the

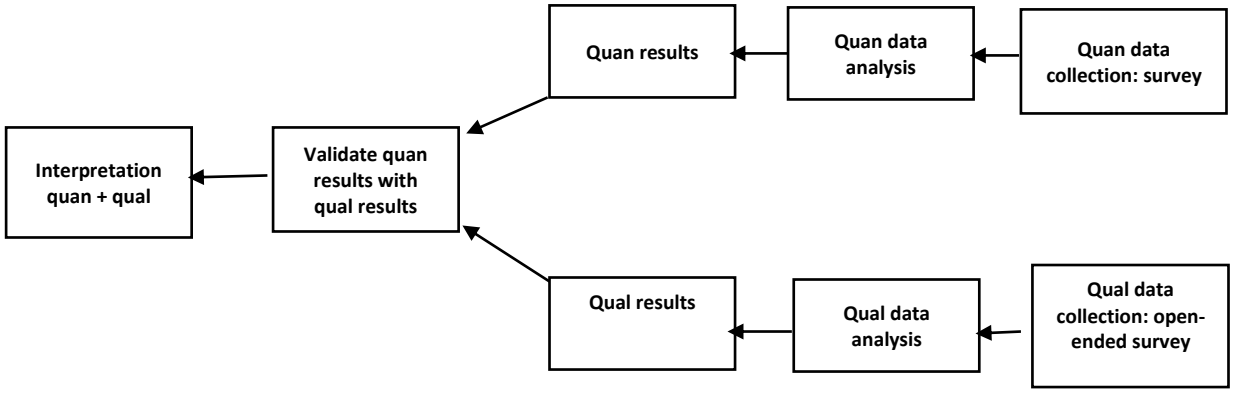
quantitative data, and thequantitative and qualitative results integrated into a single data stream so that the reader could understand the results of the study.

In the last stage of the study, the collected data were analysed using SPSS version 24. This program is a powerful statistical package that is very easy to use. Most psychology researchers prefer to use the SPSS program to analyse their research (Coolican, 2017). The Mann-Whitney U Test was used to compare the results of the experimental group and the control group and to identify differences in SNSEN and SID performance. The Mann-Whitney U Test was chosen because it is useful for comparing two independent and small groups (Pallant, 2013), and thereby is appropriate for this study. It is derived from non-parametric statistics and is useful with a sample of less than 30. The Mann-Whitney U Test can be used to conduct a simple division of one variable into two frequency levels. In addition, this test can be used to identify the association between two categorical variables with two levels each (Coolican, 2017).

Descriptive statistics was used to compare the perspectives of the teachers in the experimental group with those of teachers in the control group. These descriptive statistics included: means (M), standard deviations (St) and scores ranges. Descriptive statistics can be obtained using frequencies, description or in a number of different ways. The other reason why the descriptive statistics method was used is because the questionnaire does not study the relationships between variables or seek comparison between variables. The mean and percentages have been used in this study because these methods are consistent with the continuous variables. In addition, the continuous variables can be collected on the descriptive data on all findings in one go (Pallant, 2013; Alsalam, 2015). Moreover, the Spearman rho test was used to understand the correlation coefficient between the questionnaire items. This test is used with non-parametric tests and small groups (Pallant, 2013). Finally, descriptive statistics were computed for the open-ended questions in this study to reveal more information related to the research questions. The findings have been presented graphically in graphs and tables.

Figure 13: A sequential explanatory design (Creswell and Clark, 2007)

Figure 14: Triangulation design: validating the quantitative data model (Creswell and Clark, 2007)



3.5 Material and Instruments

Tools used in the photography career skills training: Digital books and computer-based design programmes, such as Photoshop and Paint, were used to evaluate the impact of the UDL programme on the teaching of photography lessons, where the students try to modify the photo after they take it. The framework included computer-based Programmes that

required the female students to obtain information and use specific techniques to express what they had learned. The students were also required to show how different techniques related to different types of information.

Computer program used in the workshop: PowerPoint and Prezi were used because both of these Programmes are easy to use and suitable for use with multiple technologies, such as computers, e-books, and the Internet. A PowerPoint workshop was designed to provide the teacher trainees with a comprehensive overview of the UDL method. A detailed explanation will be presented below.

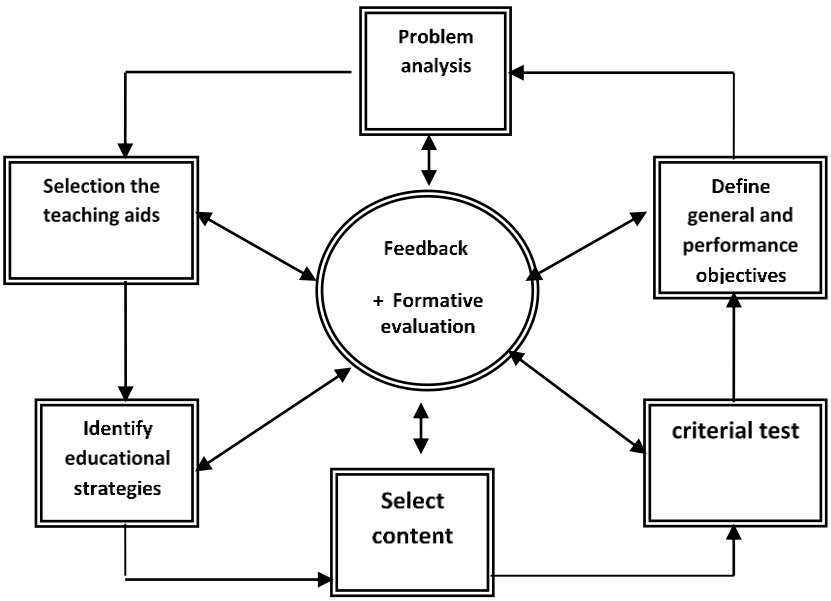
3.6 Designing a computer program using the UDL

The researcher created a scenario that was provided to a designer, who used the scenario to design a software program for use in teaching the profession of photography. The software was designed using the Flash computer program. The design cost 1200 pounds, which was paid by the Saudi Embassy, backed by King Saud University, who would benefit from the outcomes of this research. The programme aims to teach the profession of photography to both SID and SNSEN using the UDL approach. The UDL software programme was designed according to the following steps.

3.6.1 First step: Program preparation

The program was prepared following a number of steps, according to the model proposed by the researcher, as shown in Figure *15*.

Figure 15: The proposed model of educational design



3.6.2 Problem analysis

The software program was designed to teach the photography profession to both SID and SNSEN at the same time and in the same classroom. The teachers struggled with an inability to design instructional content capable of teaching both SID and SNSEN. Therefore, the design of the software program considered the educational capacity and mental and physical characteristics of SID.

A. Characteristics of SID and SNSEN

Information on the characteristics of SID and SNSEN was collected from several sources. In particular, data were collected on the mental, psychological, and social development characteristics of SID and SNSEN, the school records of these students, and the opinions of their teachers. Based on these sources, several characteristics of the target group (i.e. SID and SNSEN) were identified. These characteristics were taken into account when designing the software, as shown in خطأ! المرجع الذاتي للإشارة المرجعية غير صحيح. and Table 9.

Table 8: Things to consider when designing software for SID

Teaching difficulties involving SID	Solution in the software
	Reduce the duration of content displays in the software.
Short attention span	Add visual and audio stimuli, such as music, games, and animations, to make the software more exciting for students. Using audio and visual stimuli makes it easier for intellectually disabled people to learn and understand. It provides a simplified process of learning which has been shown to be successful (Mechling, Gast and Gustafson, 2009; Davies, Stock and Wehmeyer, 2002).
Deficiencies in understanding	Design various means to communicate information to students (e.g. audio, textual, and visual means) (Mechling et al., 2009; Davies et al., 2002).
	Use realistic stories to help students understand. Storytelling to people with intellectual disability helps them understand and build a sense of friendship, identity and community. However, stories are not employed as often (Reynhout and Carter, 2007).
	Avoid abstract and complex exercises or tests; make exercises attractive and interesting.
	Intersperse exercises with positive reinforcement. Positive reinforcement is important because it assists in increasing the chances of a certain behaviour occurring again. It is a good method of encouraging some behaviour.
Sense of failure or frustration	Use positive reinforcement, including moral, social, physical, and symbolic reinforcement.
	Make tests easy to prevent boredom and frustration.
	Allow students to choose evaluation methods that suit their abilities and desires. Tests and evaluation for intellectually disabled are important for the understanding of their functioning capability. It also helps in determining their cognitive functioning skills such as language, memory and intellectual capacity.
The memory weakness	Repeat information to generalize knowledge and solidify students' understanding of the task. Repetitive communication is important for individuals with intellectual disability as it helps them understand what is being communicated to them.

Table 9: Things to consider when designing software for SNSEN

Educational characteristics of SNSEN	**Points to consider when designing the software**
They have strong mental abilities, such as the abilities to understand, remember, and think	Provide content that fits their mental abilities, such as: - Videos that provide valuable information. - Test questions ranging from easy to difficult to increase student enthusiasm and work on the brainstorming. - Opportunities for students to choose evaluation methods that suit their abilities and desires (e.g. written, oral, and multi-question assessments). - Various means to communicate information (e.g. audio, textual, and visual means). - For many years, education was delivered in the manner of lectures and taking notes. However, over the years there have been new ideas and tools for delivery of effective lessons. Teachers now interact with students in a manner that provides an effective understanding, that is through active learning.

B - Determination of input behaviours

The pre-test was used to measure how well the students had mastered the skill of photography prior to the implementation of the software.

3.6.3 Define the general objectives of the software design

The software attempted to achieve the following goal: Teach SID and SNSEN photography. The desired behaviours were defined procedurally, as follows.

1) The student takes an A4 passport or ID picture photograph (80% of grade).

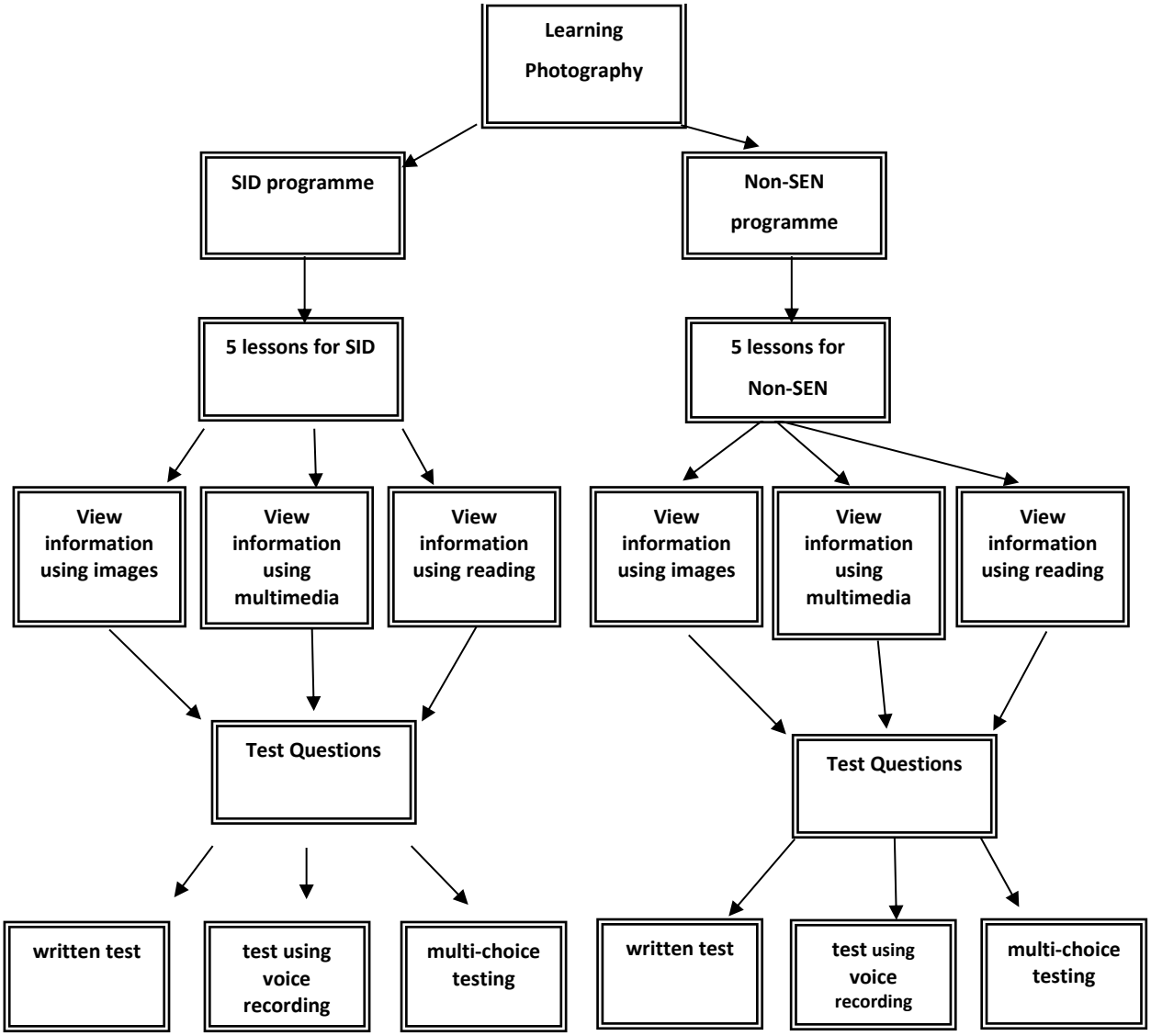
Performance Objectives: Upon completion of the software program, the student should have acquired the following skills:

1. The student knows the parts of the camera.
2. The student knows the types of cameras.
3. The student knows about different kinds of photographs.
4. The student can apply the steps necessary to take a passport picture.
5. The student can press (ON) to open the camera correctly.
6. The student can place the camera on its stand.
7. The student can set up a white background before taking a picture.
8. The student can position the camera in an appropriate place with respect to lighting.
9. The student makes sure that the client is ready to take a passport picture.
10. The student can take a picture well and according to the standards.
11. The student can print the image in the final form.

3.6.4 Content identification

The software teaches the information according to a hierarchical structure, in which similar concepts are closely related to one another via categories. The first part of the software follows an upper–lower relationship, as illustrated in Figure١٦ (prepared by the researcher).

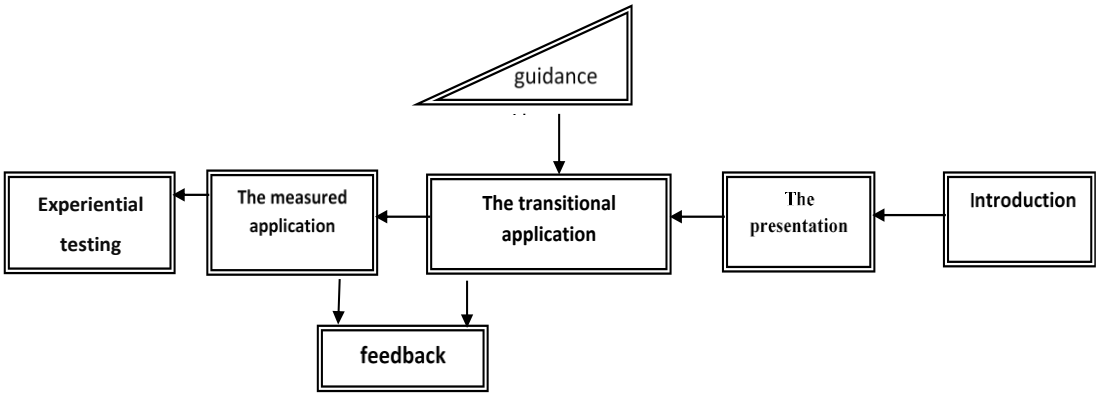
Figure ١٦: Concept map of content components



3.6.5 Identification of educational strategies

The Virginia Johnson (Seels and Glasgo, 1990) model was applied to determine the educational strategy used in the software. This model comprises five main stages: introduction, presentation, transitional application, measured application, and experiential testing. These stages also include guidance and feedback, as illustrated in Figure 17 (Seels and Glasgo, 1990).

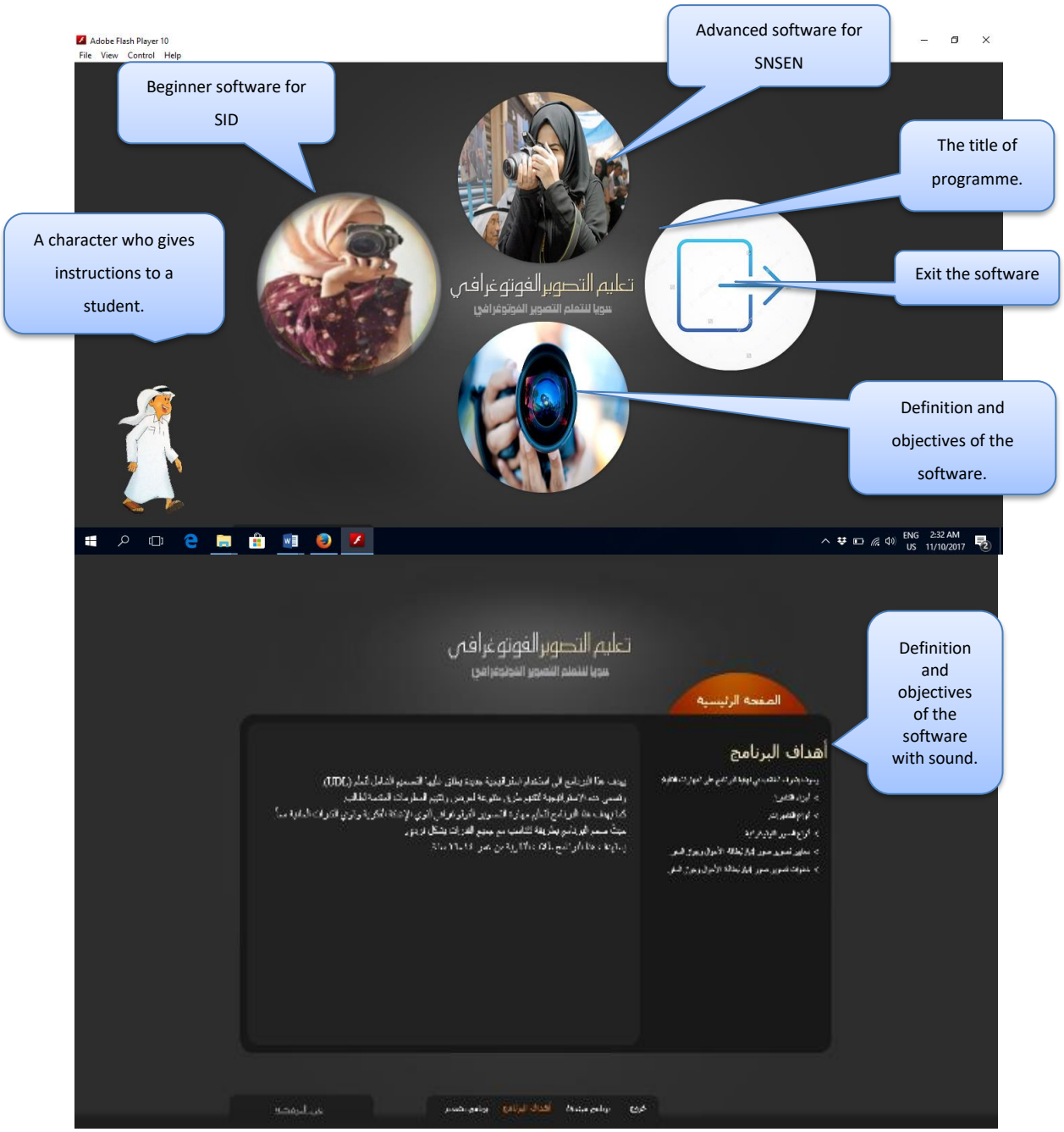
Figure 17: Virginia Johnson model



- **Introduction:**

  The introduction seeks to direct the student's attention toward learning the required skills by explaining the benefits of achieving the goals and linking the new learning objectives with previous information. The introduction was created using the following strategies and the information is displayed by both written and spoken methods. First, identify a short and interesting title. Second, present general programme objectives and performance objectives. Third, instruct students on using the software. Fourth, create a menu of contents for the lessons to enable students to move to desired topics. The following illustrates the contents of the introduction.

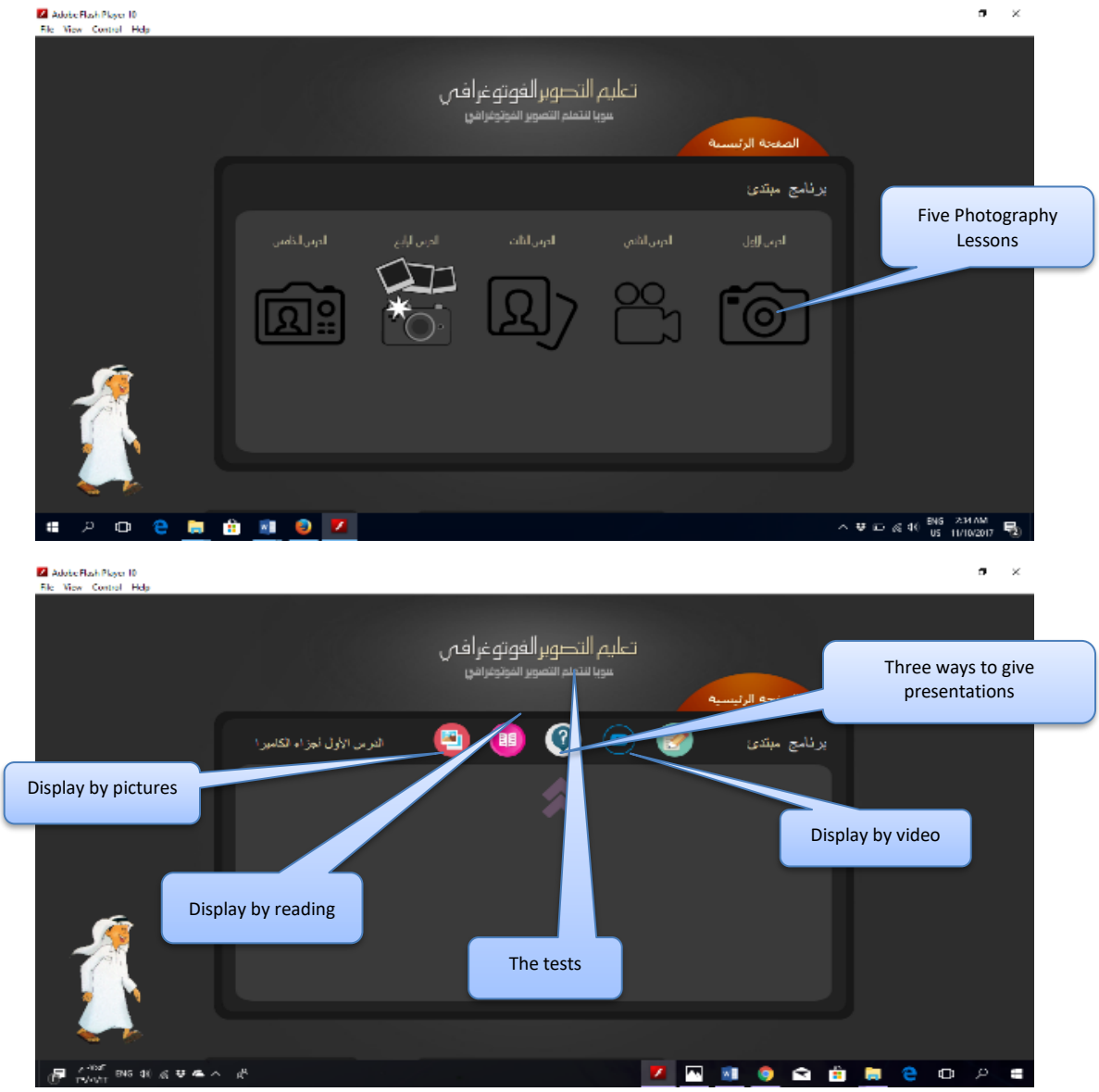
Figure 18: The contents of the introduction

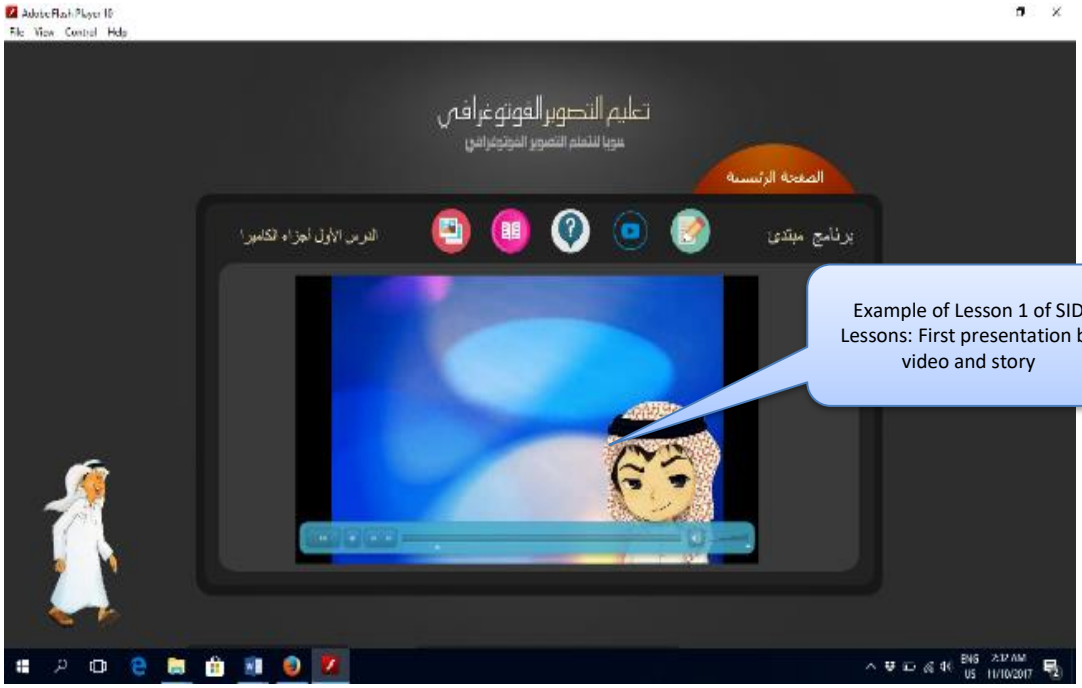


- **Presentation:**

  The software used multiple views to display the targeted educational information, including educational cards and text for reading. Stories were also used as a basic tool for communicating information. Furthermore, sound and animation were used to increase students' comprehension and attention. Figure 19 demonstrates the contents of the presentation (Coyne et al., 2012).

Figure 19: The contents of the presentation




تعليم التصوير الفوتوغرافي
الصفحة الرئيسية
برنامج مبتدئ
الدرس الأول أجزاء الكاميرا
Example of Lesson 1 of SID Lessons: First presentation by video and story


تعليم التصوير الفوتوغرافي
الصفحة الرئيسية
برنامج متقدم
الدرس الأول أجزاء الكاميرا
Example of Lesson 1 of SNSEN Lessons: First presentation by video and story


تعليم التصوير الفوتوغرافي
الصفحة الرئيسية
برنامج مبتدئ
الدرس الأول أجزاء الكاميرا
الكاميرا
هي وسيلة لإلتقاط الصور.
العدسة
هي التي تتحكم بالضوء
البطارية
هي التي تساعد على إعطاء الطاقة للكاميرا
Example of Lesson 1 of SID Lessons: second presentation by reading


تعريف الكاميرا
Example of Lesson 1 of SNSEN Lessons: second presentation by reading
Canon

Example of Lesson 1 of SID Lessons: third presentation by pictures.

Example of Lesson 1 of SNSEN Lessons: third presentation by pictures.

- **Transitional Application:**

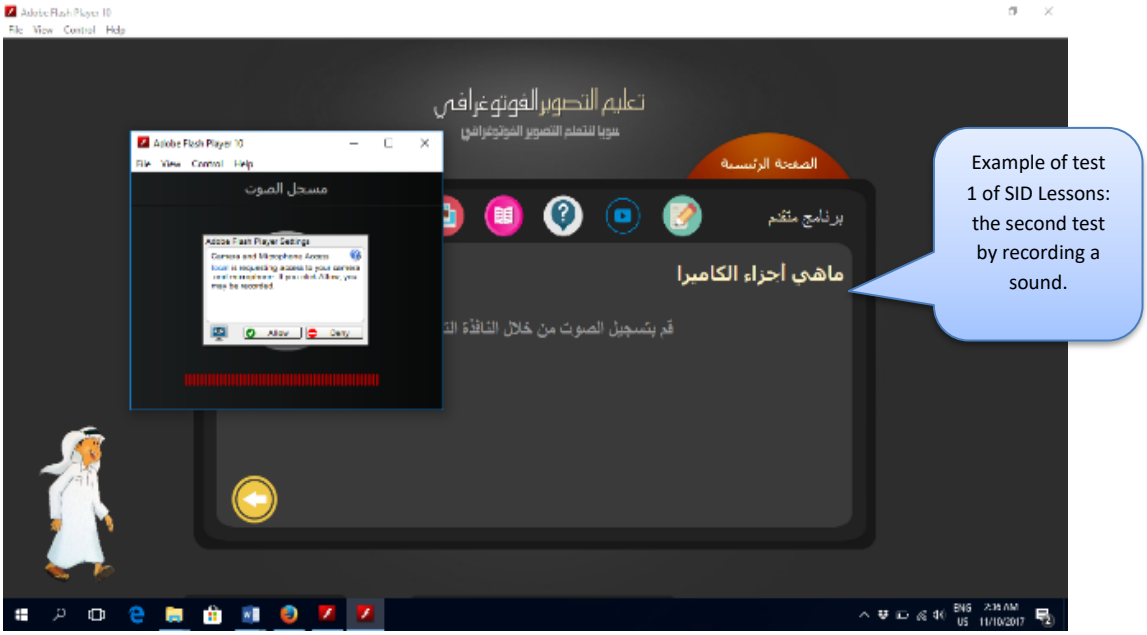
  The topics presented in the software were arranged from easiest to most difficult. Each topic included a variety of applications to measure a student's readiness to move to the next topic.

- **Tested application:**

The end of the software included a variety of tests, arranged from easiest to hardest, designed to measure the extent to which students benefitted from the software. These tests also emphasized the general and fundamental concepts presented in the topic lessons. Each test in each lesson used three types of evaluation methods: voice recordings, written tests, and multi-choice tests. Figure 20 illustrates the contents of the tests.

Figure 20: The contents of the tests


تعليم التصوير الفوتوغرافي
الصفحة الرئيسية
برنامج متقدم
الدرس الأول أجزاء الكاميرا
ماهي أجزاء الكاميرا
و
و
Example of test 1 of SID Lessons: First, test by writing.


تعليم التصوير الفوتوغرافي
الصفحة الرئيسية
برنامج متقدم
مسجل الصوت
ماهي أجزاء الكاميرا
Example of test 1 of SID Lessons: the second test by recording a sound.

For the test of SNSEN, we applied the same method of SID testing but which was harder and commensurate with their mental abilities.

- **Feedback:**

  Students are provided feedback as follows:

➢ If a student's answer is correct: the correct answer is reinforced by a sound as this voice says to the student - well done, excellent, you are wonderful. Also, appearing on the screen is a tag ✓ or ☺ .

➢ If a student's answer is wrong: a voice tells the student "try again"; then, the student is guided to try again. If the student fails for the second time, the verbal aid and the gestures aid appear to the student, to avoid the student to feel frustration.

- **Guidance:**

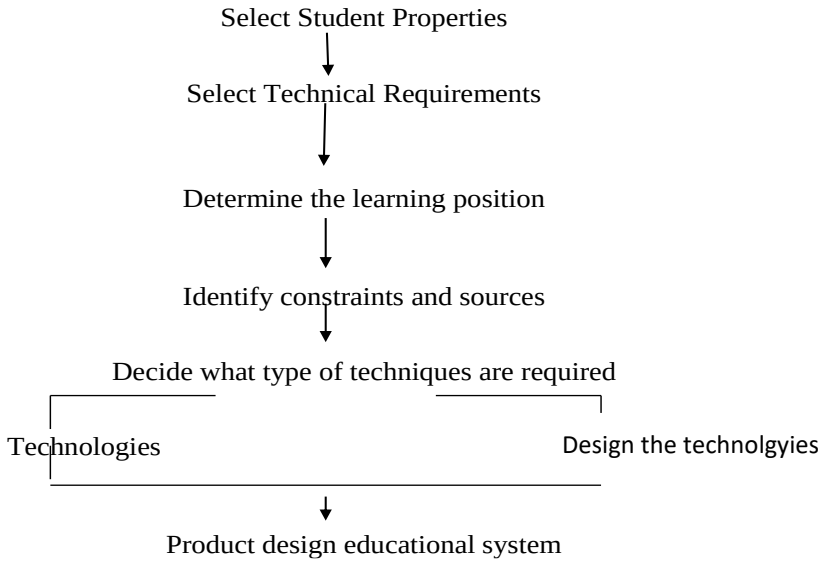
  A set of instructions was developed to help the students control the software (except for the tests) and to provide guidance and reinforcement to help students excel in their performance, solve exercises, and easily move from one slide to another. For example, in this

software an exit icon was put on every slide to help the student to close the programme easily. Moreover, on all slides written and audio instructions were used by the character in the software to facilitate student transfer on this software. Also, flashes were used to attract the student's attention to the task points, such as some important themes, images, icons, etc. Finally, icons or illuminated signs were placed to enable easy movement between slides, to move backward and forward.

3.7 Selection of teaching techniques

Based on the structured procedural steps model for the selection of instructional techniques described in Figure 21, and after collecting information on the characteristics of SID and SNSEN, multimedia technology was selected after collecting information on the characteristics of the SID and SNSEN. Computer technology offers promising new approaches to reducing the dependence of SID students on others. Moreover, the multimedia-based computer program is confirmed to be a way of supporting individual SID to more independently gain community-referenced vocational skills (Davies et al., 2002; Riffel, Wehmeyer, Turnbull, Lattimore, Davies, Stock and Fisher, 2005). In addition, technical requirements (i.e. the need for computers) were identified. The next stage involved selecting the location of the presentation of the software (i.e. the computer lab) after collecting information about potential obstacles that could disrupt the presentation of the software (e.g. the lack of Programmes to run the software and the lack of necessary devices). Through these steps, the type of technology was determined to suit the targeted students. Thus, the product design of the educational system comprised the following stages, as shown in Figure 21.

Figure 21: Model of selection of teaching techniques (Seels and Glasgo, 1990)



3.7.1 Formative evaluation

The program was subjected to evaluation, experimentation, and revision during its development. Specifically, it was reviewed by four teachers of special education (see appendix 32), who identified its strengths and weaknesses and verified its validity. Some of the points were modified after arbitration by the teachers. First, icons were added to enable easy movement on each slide of the software. Second, test questions were facilitated for SID students to fit their mental level. Third, some unclear images were changed in the software. Fourth, some of the incomprehensible words were modified in the software.

3.7.2 External validity of the software

The external validity of the software was determined after the experiment was implemented by comparing the students' performance during the use of the software with their performance during the follow-up stage. In order to generalize the task, the students were observed for four sessions two weeks after the post-observation.

3.8 Ethical considerations

Initial support for this research study was provided by the School of Education in King Saudi University. The researcher obtained a research licence from the Ministry of Education in Saudi Arabia. The researcher also conducted a brief initial visit to the study location to seek a mandate from the local authority and inform them of the researcher's intention to conduct the survey. Furthermore, all participants gave their voluntary consent to participate and were not coerced into participating. According to Resnik (2016), standards of ethics are important in research because they enable researchers to address potential ethical problems. Since the present study was a classroom research study, there was no risk to any participant, and no participant was asked to do anything outside of normal classroom practice or curriculum innovation.

3.8.1 Informed consent

The consent form was explained to each SID. The researcher also verbally explained to each participant the potential risks, voluntary participation, aims and objectives of the project. Moreover, the researcher provided the participants' parents with written information sheets (see appendix 7 and 8). The consent form confirmed that the researcher acted solely as an observer and did not interact with the female students in the classroom. In addition, the researcher explained the participant information sheet (PIS) form to both the SNSEN and SID female participants, and images were used to explain the project to the SID participants (see appendix 9 and 10). The research participants were made aware of their right to withdraw at any stage of the research project and provided with contact details for the researcher in the event of concerns and/or queries. Research information sheets and researcher contact details were also directly supplied to the teaching staff involved in the project. Informed consent was obtained from the teachers to ensure all participating teachers understood the purpose of the study and were willing to cooperate with the intervention procedures. Furthermore, all teachers were enrolled in a training workshop prior to the start of the intervention with the children. This workshop ensured that the teachers understood the elements of the intervention and felt confident undertaking this pedagogical exercise in their classrooms. Though this research proposes a new approach to teachers' practice - namely, teaching SID and SNSEN students together - there were no risks to any participant, and no one was asked to do anything outside of normal classroom practice or curriculum innovation.

In summary, the female students worked within their usual school environment. The above protocol meets the required standards for educational research (BERA, 2012).

3.8.2 Confidentiality and anonymity

The proposed research project did not pose any additional threats or risks to participating female students or staff. Confidentiality is paramount to the research study; therefore, no child is personally identifiable in any reports of findings, and all data outcomes have been coded into case numbers.

3.8.3 Data security

Data outcomes, such as checklists of progress and the questionnaire, were stored digitally on password-protected computers.

3.8.4 Potential risks or hazards

Some participants may have been concerned about the possible disclosure of their identities. To alleviate such fears, the researcher has ensured that all information is protected and remains confidential. During the transcription process, the participants' data were anonymized, and all identifying information, such as names and places, was removed. The participants' information has been coded to ensure confidentiality. Furthermore, the researcher has stored the participants' consent forms and questionnaires in a secure, locked cabinet at the University of Strathclyde, Glasgow. The copies of classroom activities have been stored in the researcher's private computer and encrypted and protected with passwords. These data have been coded and stored with a PIN number and a hidden file to ensure confidentiality. The student participants faced no potential risks related to taking part in this research. None of the research methods caused the participants stress or psychosocial harm. This research study was conducted to answer questions concerning vocational training, and which involved no risks to any of the participants.

3.9 Conclusion

This chapter has explained the research methodology used to conduct this study. It presented and justified the chosen research philosophy and paradigm. This study has used the positivism paradigm because the essential aim of this research was to know the effect of

using UDL on learning the skill of photography and the difficulties faced in this method during application. Another objective of this study is to know the relationship between inclusion and UDL use. The convergent mixed methods design was selected due to its advantages in reducing the limitations and restrictions of quantitative and qualitative research approaches. The data collection took place in mainstream high schools in KSA.

The data collection comprises four methodological research tools: a questionnaire for teachers, observation for classrooms and students, pre- and post-testing of students and open questions for teachers. The Mann-Whitney U Test was used to analyse the data from students. Also, descriptive statistics were used to compare the perspectives of the teachers in both groups. Finally, the chapter identified ethical considerations for the research and the ethical approval was obtained from the University of Strathclyde Ethics Committee. The results of the study will be introduced in the next chapter.

4 CHAPTER FOUR: THE RESULTS

As discussed in the previous chapter, both quantitative and qualitative data were gathered. Quantitative data were collected using questionnaires and direct observations and focused on understanding the effect of UDL on the ability of intellectually disabled students and their peers to learn photography skills. This data also sought to capture insight into the barriers to implementing UDL at secondary mainstream schools in Saudi Arabia and the current status of the implementation of the three UDL principles by teachers of SID. To analyse this quantitative data, various illustrations were used, such as line graphs and pie charts. Moreover, SPSS was used to analyse the data in more depth. The sample data were analysed and results were obtained in order to answer the research questions posed earlier.

The qualitative data was focused on teachers' views on the possibility of using UDL to achieve greater inclusion amongst students. Qualitative information was collected through the use of open-ended questions posed to a number of teachers. The nature of the questionnaires, observations and open-ended questions used were explained in more detail in the methodology chapter.

This chapter will describe the results of the pre- and post-tests for students of SID and SNSEN in the experimental and control groups. Then, it will compare the results of across these groups. Moreover, the results will present teachers' views on helping UDL to integrate students with SID with their peers. In the end, the responses to the questionnaire will be analysed to identify the barriers and advantages and disadvantages of UDL implementation. The results will be presented in this chapter based on the order of the research questions. Thus, we will start by addressing the first research question.

4.1 The results for the first question: the experimental and control group

***The first question*:** What is the effect of using UDL on the acquisition of photography profession skills in a vocational programme for SID?

SID and SNSEN students were divided into two groups, an experimental group and a control group. Each group consisted of six from each category, thus giving the total of 12 intellectually disabled students (SID) and 12 non-special education students (SNSEN). Every student was numbered from 1 to 12 across both groups; 1 to 6 for SID and 7 to 12 for SNSEN. This was done to safeguard the participants' identities.

4.1.1 Teaching methods preferred by students to learn - experimental group

First, a form was distributed to the teachers, which sought to collect information about the students (see appendix 27and 37, which shows general information on students' application). This form sought to understand the teaching methods used, reinforcement tools applied and the favourite methods of every student in each group. This is one of the UDL steps that the teachers should start with. The aim of this step is to design the curriculum to suit the needs of all students.

The results show that most students liked all the learning methods on offer, for example learning using visual aids, videos, computers, physical symbols or being encouraged with moral support. In addition, they liked all types of evaluation on offer in the context of homework, face to face evaluation and group participation.

4.1.2 Understanding of the teachers for the UDL method - experimental group

When the experiment was being carried out, first, the researcher had to evaluate the teachers' performance by observing them. The UDL commonly known as the UDL method was used (see appendix 37). The method was necessary to determine whether or not the teacher met the three UDL principles being applied when learners were being taught photography skills in their experimental and control groups. The UDL method includes multiple types of presentation, multiple types of expression and multiple types of

engagement. After analyzing this, the researcher would conclude if the teacher was implementing these principles appropriately or not.

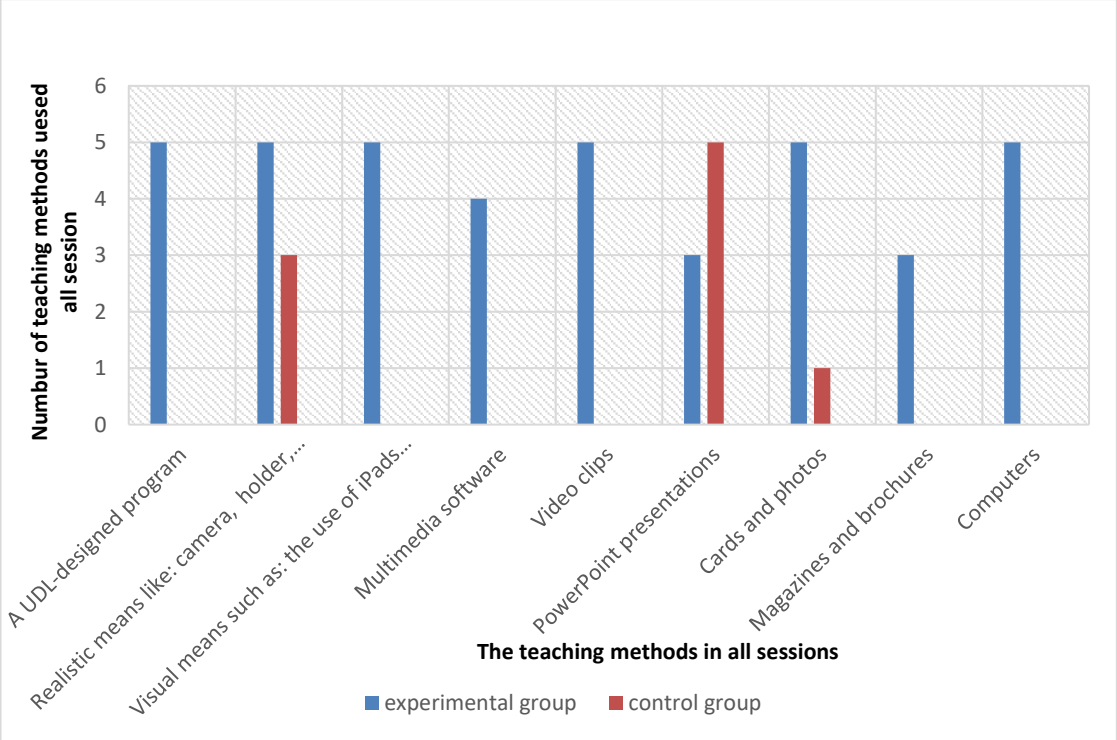
The outcome of the results was not very satisfying since the teachers had all failed to implement UDL principles, especially in the 1st, 2nd and 3rd sessions. However, in the last two sessions (4th and 5th sessions), the researcher noted that they had fully implemented the UDL principles, which was a little more pleasing. After keenly concentrating on the results of the first three sessions, the researcher noted that the teachers were suffering from the difficulty to understand the strategy required to enforce the UDL principles, given that their attempted application of it failed completely, according to the observation lists (see appendix 38).

4.1.3 Teaching and evaluation methods and presentation of information across the two groups

The results were obtained from the observation lists for each student (see appendix 30).

4.1.3.1 Types in the experimental and control groups

Figure 22: Comparison of teaching methods in the experimental group using the UDL approach to a control group using alternative methods of teaching

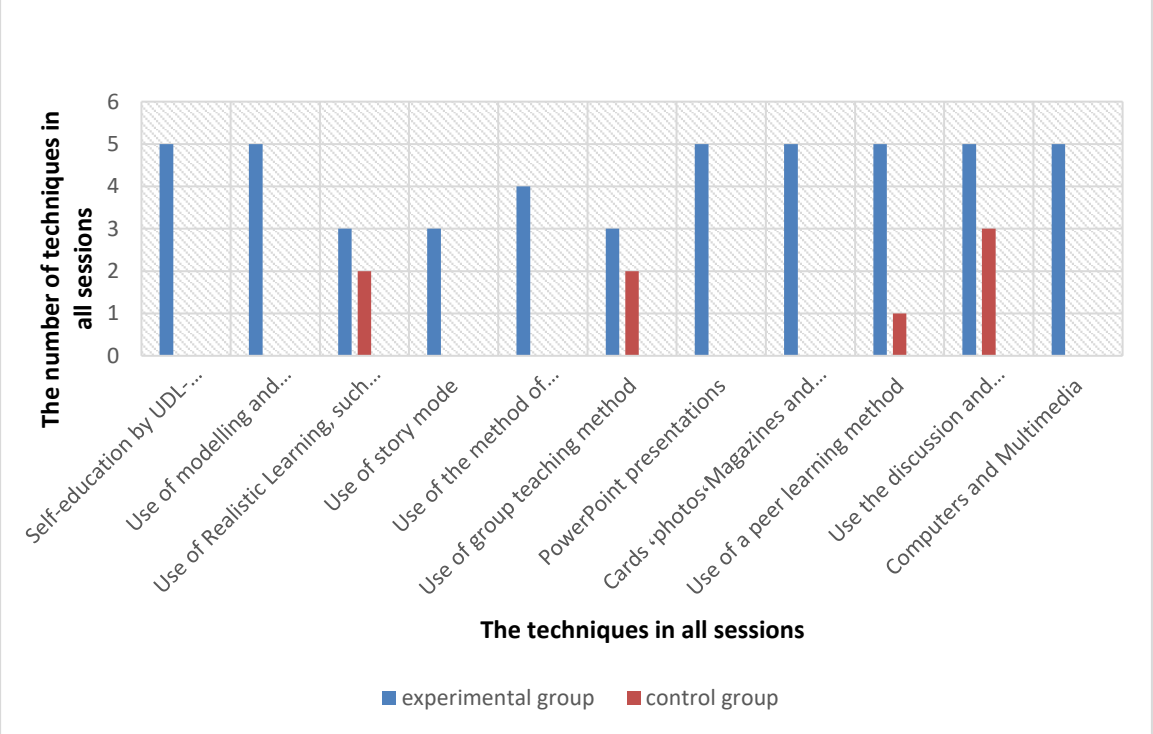


The teachers each had five lessons, with every lesson divided into two sessions (see appendix 29 for more information about the techniques used in each group). This meant that the total number of sessions was ten. From Figure 22, the results have explained that the teachers use a variety of different types of instruments to deliver information to the students: 8 is the mean number of instruments used in each lesson. This includes the use of audio (recordings, audio tools), visual types (videos, interactive software) and real-world types (cameras, printers, paper). Also, smart devices were used (for example, computers, iPads, smart boards). They also designed programmes to fit with the needs of both SID and SNSEN students.

On the other hand, the findings of the control group showed that just two types were used; typically, real-world equipment and PowerPoint were the tools they used.

4.1.3.2 Types of teaching or presentation in the experimental and control groups

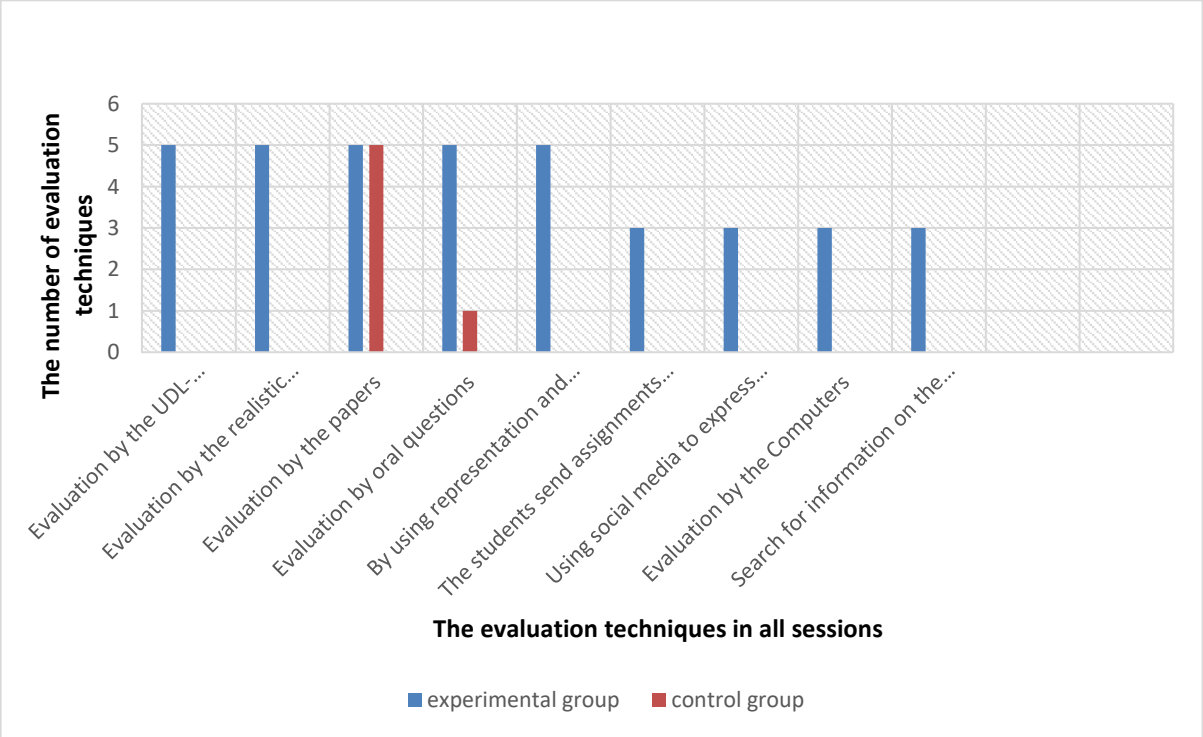
Figure 23: Comparison of techniques used in the UDL experimental group with a control group



The teachers used approximately nine instruments in the experimental groups during our evaluation. Some of them included peer education, representation of roles, self-education, and modelling. Alternatively, our results exemplified that the teachers, to deliver information in the control group, used only two methods - dialogues and discussions. Also, they depended much more on group explanations, and sometimes used partner-based learning tools which led to easy problem solving among the learners (see Figure 23; also see appendix 29 for more information about the techniques used in each group).

4.1.3.3 Types of evaluation used in the experimental group and control group

Figure ٢٤ : Comparison of the evaluation techniques used in the UDL experimental group with a control group



According to Figure٢٤ , the teachers first used seven different methods in each lesson to evaluate SID and SNSEN students in the experimental groups (see appendix 29 for more information about the techniques used in each group). These methods included social media,

computer interactive Programmes, and the Internet. Afterward, they used the common evaluation methods, for instance papers and games, which were liked by many students. For the control groups, the researcher learned that the teachers continuously used the paper-based method for evaluation of the students since they thought it was the most convenient method.

4.2 Comparison of students' results in the experimental and control groups

The pre and post-test form helped to define the extent to which each student was able to master professional photography. Each item was scored at grade 9, except for the 10th, which was scored at 10. It can be argued the student was able to pass the course and was able to learn photography, when the student achieves a score of between (80 to 100%) . In the case of the student achieving a score of between (50 to 79%) the result is described as (somewhat). The meaning of “somewhat” is that the student will need more training to learn a photographic profession to be able to pass in the future. Further, if the students scored less than 49%, they would not be allowed to study photography. These correction criteria are based on the Executive Rules of the Secondary Student Assessment Regulations of Saudi Arabia. A score of between 80 to 100% is a pass, but a score of less than 50 % means that the student did not pass. If a student scores between 49 and 79%, they are deemed to have partially passed and need more training (Ministry of Education, 2016). Next, students' results will be reviewed for the pre-and post-tests in all groups.

4.2.1 The pre-test amongst SID and SNSEN in the experimental group

Table 10 shows the performance of all students in each skill prior to learning photographic skills. These results will help teachers to focus on the weaknesses of students and teach more effectively. Conversely, Table١١ shows the scores of each student when exhibiting their final skills. The data allows the teacher to judge whether or not they have passed. The information also applies to the control group.

Table 10: Achievement of SID and SNSEN students in each skill, pre-test, experimental group

Standards and Tasks	The number of SID and SNSEN		
	Passed	Somewhat	not passed
What are the parts of the camera?	4 SID 6 SNSEN	2 SID 1 SNSEN	
What types of cameras?	5 SNSEN	2 SID 2 SNSEN	4 SID
What kinds of photographs?		5 SNSEN ٢ SID	١ SNSEN 4 SID
What are the steps to take a passport picture?	3 SNSEN	١ SNSEN 1 SID	٣ SNSEN ٥ SID
Can the student open the camera correctly?	6 SNSEN	١ SNSEN 3 SID	3 SID
Does the student put the camera on the stand?	2 SID 3 SNSEN	4 SNSEN 1 SID	4 SID
Does the student use a white background before taking a picture?	2 SID 1 SNSEN	4 SNSEN	٢ SNSEN 4 SID
Does the student put the camera in the proper lighting place?	2 SNSEN	5 SNSEN	6 SID
Does the student make sure of the client's commitment to the terms of taking a picture of a passport?	6 SNSEN	2 SNSEN	6 SID
Can the student take a picture well and according to the standards?	1 SNSEN	6 SNSEN	6 SID
Can the student print the image in a final form?	2 SNSEN	3 SNSEN	٢ SNSEN 6 SID

Table 10 describes the total achievement of SID and SNSEN in each skill before their photography training. The results of SID showed that most either failed or were only somewhat successful. For SNSEN, most either passed or were somewhat successful.

Table ١١: The average score for students in the experimental group in photography lessons, pre-test

No. of students SID	Passed	Somewhat	Not Passed
Student no.1			٤,٥
Student no.2			٤,٥
Student no.3			٣٦
Student no.4			40.5
Student no.5			40.5
Student no.6			4.5
The total number of students			٦
SNSE			
Student no.7		٧٧	
Student no.8		٥٩,٥	
Student no.9		٦٨	
Student no.10		٦٨	
Student no.11		٧٢,٥	
Student no.12		٥٩	
The total number of students		٦	

When comparing the student's grades in the pre-test, the results show that all SNSEN have obtained higher scores than the SID. TheSNSEN were somewhat successful (59-77%), six students with SID did not pass (4.5-40.5%). The reason may be that SNSENs' academic and practical abilities are higher than those of SID (see Table١١).

4.2.2 The post-test amongst SID and SNSEN in the experimental group

Table 12 illustrates the performance of all students in each skill after learning photography. These findings will support teachers' ability to understand student weaknesses. Table١٣ shows the scores of each student when exhibiting their final skills. The data allows the teacher to judge whether or not they have passed. The information also applies to the control group.

Table 12: Achievement of SID and SNSEN students in each skill, post-test, experimental group

Standards and Tasks	The number of SID and SNSEN		
	Passed	Somewhat	not passed
What are the parts of the camera?	6 SNSEN 5 SID	1 SID	
What types of cameras?	6 SNSEN 3 SID	2 SID	
What kinds of photographs?	6 SNSEN 3 SID	3 SID	1 SID
What are the steps to take a passport picture?	6 SNSEN 5 SID	1 SID	
Can the student open the camera correctly?	6 SNSEN 6 SID		
Does the student put the camera on the stand?	6 SNSEN 5 SID		
Does the student use a white background before taking a picture?	6 SNSEN 6 SID	1 SID	
Does the student put the camera in the proper lighting place?	6 SNSEN 5 SID		
Does the student make sure of the client's commitment to the terms of taking a picture of a passport?	6 SNSEN 5 SID	1 SID	
Can the student take a picture well and according to the standards?	6 SNSEN 4 SID	1 SID	
Can the student print the image in a final form?	6 SNSEN 5 SID	1 SID	

The outcome of the post-test among the SNSEN showed that all learners had successfully passed the skills, where each student achieved a 100% score. The researcher's conclusion

was that students could take photographs without any help and guidance from their teachers. For the SIDs, the six students passed the photography skills at between (86.5-100%), as shown in Table 1213.

Table ١٣: The average score for students in the experimental group in photography lessons, post-test

No. of students SID	Passed	Somewhat	Not Passed
Student no.1	100		
Student no.2	٩١		
Student no.3	٩٠		
Student no.4	٩١		
Student no.5	٩١		
Student no.6	٨٦,٥		
The total number of students	6		
SNSEN	100		
Student no.7	١٠٠		
Student no.8	١٠٠		
Student no.9	١٠٠		
Student no.10	١٠٠		
Student no.11	١٠٠		
Student no.12	١٠٠		
The total number of students	6		

From Table١٣ , the results show that all six students with SID and all six SNSEN passed in the experimental group.

4.2.3 The pre-test amongst SID and SNSEN in the control group

Table 14: Achievement of SID and SNSEN in each skill, pre-test, control group

Standards and Tasks	The number of SID and SNSEN		
	Passed	Somewhat	not passed
What are the parts of the camera?	٣ SNSEN 4 SID	3 SNSEN 2 SID	
What types of cameras?	3 SNSEN 3 SID	3 SNSEN 3 SID	٤ SID
What kinds of photographs?	4 SNSEN	1 SNSEN 2 SID	١ SNSEN 2 SID
What are the steps to take a passport picture?	3 SNSEN	2 SNSEN 4 SID	1 SNSEN 1 SID
Can the student open the camera correctly?	5 SNSEN 1 SID	١ SNSEN 1 SID	5 SID
Does the student put the camera on the stand?	1 SNSEN	٤ SNSEN	١ SNSEN 6 SID
Does the student use a white background before taking a picture?	٢ SNSEN	٢ SNSEN 4 SID	٢ SNSEN 2 SID
Does the student put the camera in the proper lighting place?	4 SNSEN	١ SNSEN 3 SID	١ SNSEN 3 SID
Does the student make sure of the client's commitment to the terms of taking a picture of a passport?	5 SNSEN	١ SNSEN 6 SID	
Can the student take a picture well and according to the standards?	2 SNSEN	٤ SNSEN 1 SID	5 SID
Can the student print the image in a final form?	1 SNSEN 5 SID	1 SID ٤ SNSEN	١ SNSEN

The Table 14 shows the results of students in the pre-test for each skill. More often than not, the SNSEN were somewhat successful or passed, whereas SID were somewhat successful or failing.

Table١٥: The average score for students in the control group in photography lessons, pre-test

No. of students SID	Passed	Somewhat	Not Passed
Student no.1			٤٩
Student no.2			٤١
Student no.3			٢٢,٥
Student no.4		54.5	
Student no.5			18.5
Student no.6			23
The total number of students		١	٥
SNSEN			
Student no.7		72.5	
Student no.8			45
Student no.9		٧٩	
Student no.10		٧٦,٥	
Student no.11		67.5	
Student no.12		٥٠	
The total number of students		٥	١

Table١٥ shows that the results of SNSEN in the pre-test are higher than those of SID. Five students from SNSEN were somewhat successful, achieving between (50-79%) and one student did not pass (45%). With the SID, five of them did not pass, achieving from (18.5 to 49%) and one was somewhat successful (54.5%).

4.2.4 The post-test amongst SID and SNSEN in the control group

Table 16: Achievement of SID and SNSEN students in each skill, post-test, control group

Standards and Tasks	The number of SID and SNSEN		
	Passed	Somewhat	not passed
What are the parts of the camera?	4 SNSEN 4 SID	2 SNSEN 1 SID	1 SID
What types of cameras?	6 SNSEN 3 SID	3 SID	
What kinds of photographs?	5 SNSEN	3 SNSEN 3 SID	3 SID
What are the steps to take a passport picture?	6 SNSEN	2 SID	4 SID
Can the student open the camera correctly?	6 SNSEN 1 SID	4 SID	1 SID
Dose the student put the camera on the stand?	6 SNSEN	6 SID	
Does the student put a white background up before taking a picture?	5 SNSEN	1 SID	5 SID
Does the student put the camera in the proper lighting place?	6 SNSEN	5 SID	1 SID
Does the student make sure of the client's commitment to the terms of taking a picture of a passport?	5 SNSEN 3 SID	3 SID	1 SNSEN
Can the student take a picture well and according to the standards?	6 SNSEN 3 SID	6 SID	
Can the student print the image in the final form?	2 SNSEN 3 SID	3 SNSEN 1 SID	1 SNSEN 2 SID

Table 16 shows that most SNSEN were able to learn photography skills. However, there are three students that did not pass (2 to 3) skills. For SID, most were only somewhat successful in most skills.

Table ١٧: The average score for students in the control group to learn photography lesson, post-test

No. of students / SID	Passed	Somewhat	not Passed
Student no.1			45
Student no.2		63	
Student no.3		59	
Student no.4		50	
Student no.5		68	
Student no.6		59	
The total of students		5	
SNSEN			
Student no.7	95.5		
Student no.8	100		
Student no.9	100		
Student no.10	86.5		
Student no.11	82		
Student no.12	91		
The total of students	6		

Table١٧ shows students' final results in the control group. It shows that nearly all of the SID students were somewhat successful, only one student did not pass. Five students achieved "somewhat", with a rate of (50-68%), and the student that failed achieved (45%). For SNSEN students, six passed (82-100%), although some where only somewhat successful (40.5%) in some of the photography tasks.

4.2.5 Comparison of the pre- and post-test results between the experimental and control groups

The first research question that this study asked was 'What is the effect of using UDL on the acquisition of professional photography skills in vocational programmes for SID?' The type of variables implied in this question is continuous variables. This variable is the UDL strategy to improve the photography skills of students. Continuous variables can be collected within the descriptive data on all the findings in one go (Pallant, 2013; Alsalam, 2015). Moreover, the current study compared pre and post improvements in the results of students in

experimental and control groups. Thus, the hypothesis is: there is a significant effect when using UDL on the acquisition of professional photography skills in vocational programmes for SID. This refers to the effect being more so than the usual methods used in teaching SID. To test this hypothesis, a Mann-Whitney U Test was used to compare the pre-test and post-test of students in both the experimental and control groups to reveal how students are performing in one group. Then the percentage scores of post-tests were compared across the experimental and control groups to understand if UDL is better than the normal methods used to teach photography skills. In addition, this study used a Mann-Whitney U Test because it is suitable for small groups and helps for comparisons across two independent groups (Pallant, 2013). The importance of using this test has been explained in the methodology chapter for more information see (§ 3.4)

The pre- and post-tests contained eleven questions to measure the degree of improvement after the application of the UDL program, focusing on camera elements and photographic techniques. As mentioned previously, the extent of students' improvement after UDL was applied were scored on these levels: 80 to 100% = passed, 50 to 79% = somewhat passed, less than 49% = failed.

Table 18 and

Table 19 show that there is a statistically significant difference between the control and experimental groups in the pre- and post-tests. Therefore, the results were reported for the median values for each group, because a Mann-Whitney U Test uses medians to see whether the differences between medians is statistically significant (Coolican, 2017; Pallant, 2013).

The median = 48. To calculate the size of the effect, the following equation is used:

r= z/square root of N, where N = total number of cases (Pallant, 2013).

Z= -2.25 and N=48; therefore, the r value is 0.09. "This would be considered a very small effect size using Choen (1988) criteria of .1= small effect, .3=medium effect, .5=large effect" (Pallant, 2013).

Finally, the results are that theMann-Whitney U Test detected a significant difference in the degree of students in experimental groups (SID, Md=86.2, n=6 and SNSEN, Md= 100, n=6) and the degree of students in the control group (SID, Md= 56.7, n=6 and SNSEN, Md= 88.7, n=6), U= 4.0, P= .02, r= 0.09.

In addition, Figure 25 describes the extent to which students in the post-test of the control and experimental groups improved. However, results indicate that students in the experimental group, which used UDL to learn photography, developed more quickly than those in the control group. There was a marked improvement in the performance of SID and SNSEN in the experimental group. Six SID obtained a pass in the post-test (100%). This result is high for a pre-test, as six SID did not pass. In the SNSEN group, all students passed (100%), and in the pre-test, six students were somewhat successful.

On the other hand, SID's control group results illustrated that five students did not completely pass the pre-test, but one did with 54.5%. For the post-test results, five students passed while one failed, having scored 18.5%. In contrast, six students from SNSEN improved, attaining (82-100%).

In conclusion, the students from the experimental group had higher photography skills than those in the control groups. Nevertheless, the only difference was the scoring of the grades. This is clearly shown in

Figure 26.

Table 18: Comparison of experimental group and control group scores

Groups	Test	Students	Mean	N	Std. Deviation	Median
Experimental	Pre	SID	16.5000	6	14.41874	11.2500
		SNSEN	71.0000	6	3.67423	70.2500
	Post	SID	77.1667	6	21.82353	86.2500
		SNSEN	100.0000	6	.00000	100.0000
Control	Pre	SID	35.0000	6	15.50161	32.0000
		SNSEN	68.0	6	22.4	65.5
	Post	SID	56.7	6	9.3	56.7
		SNSEN	87.9	6	12.1	88.7
		Total	64.0	48	29.1	68.0

Table 19: Mann-Whitney U Test score between contral and experimental groups

Groups	Test	Students	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig.(2-tailed)
Experimental	Pre	SID	4.0	25.0	-2.2-	.024
		SNSEN	4.0	25.0	-2.2-	.024
	Post	SID	5.0	23.0	-2.1-	.022
		SNSEN	5.0	23.0	-2.1-	.022

Groups	Test	Students	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig.(2-tailed)
Control	Pre	SID	4.0	25.0	-2.2-	.024
		SNSEN	4.0	25.0	-2.2-	.024
	Post	SID	5.0	23.0	-2.1-	.022
		SNSEN	5.0	23.0	-2.1-	.022

Groups	Test	Students	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig.(2-tailed)
Experimental	Post	SID	5.0	23.0	-2.1-	.022
		SNSEN	5.0	23.0	-2.1-	.022
Control	Post	SID	5.0	23.0	-2.1-	.022
		SNSEN	5.0	23.0	-2.1-	.022

Figure 25: Results of students in the experimental and control groups

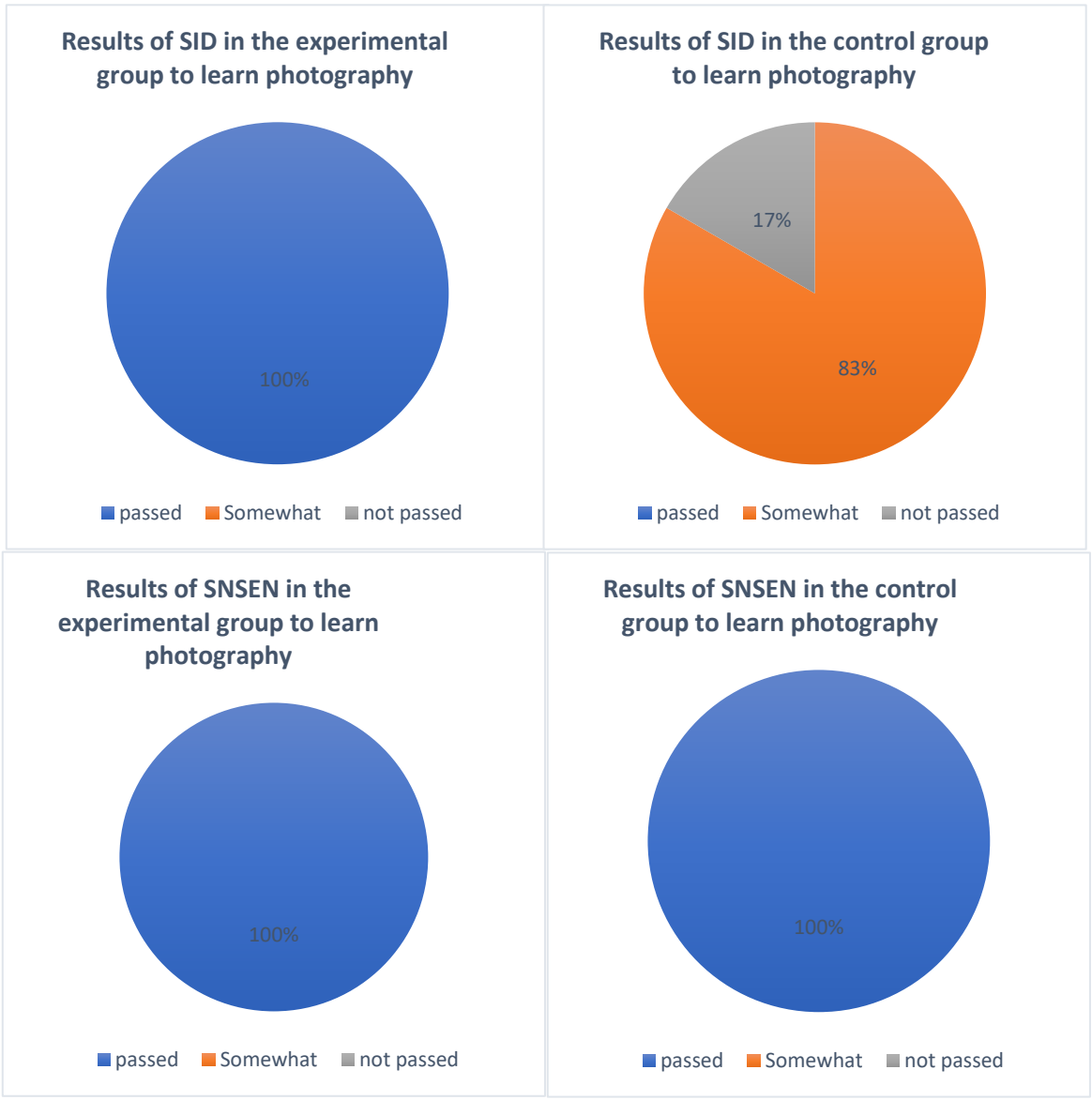
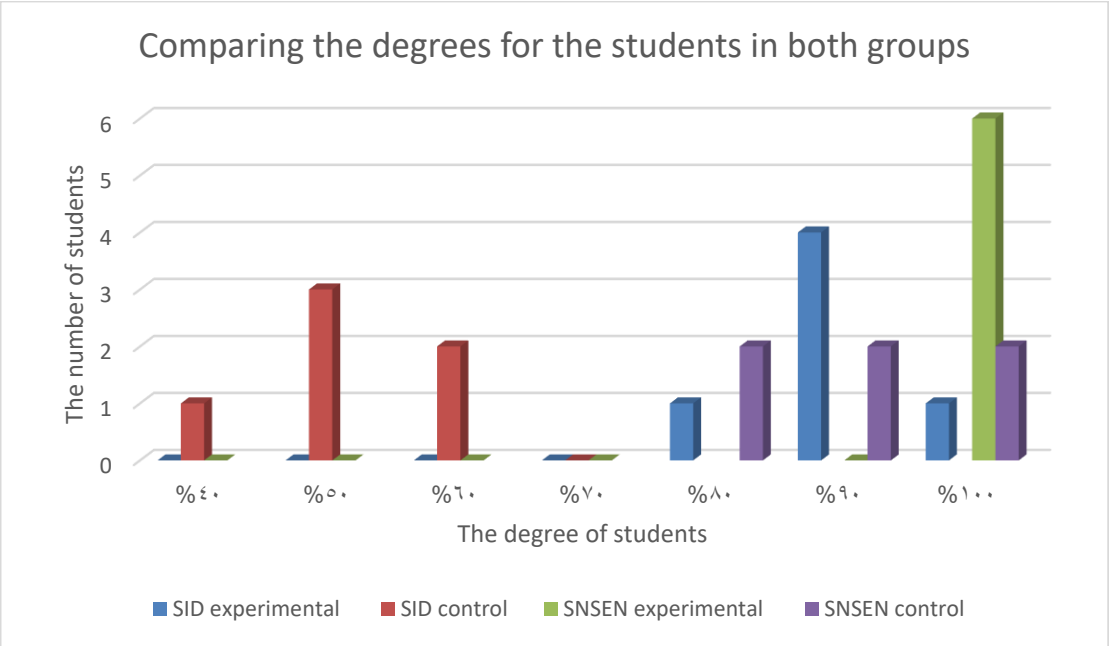


Figure 26: Comparing the degrees for students in both groups in post-test



For more information about students' outcomes to learn the photography skills, through the daily observation lists, the results of each student were presented separately for the pre- and post-tests.

4.3 Data analysis for the experimental and control group to answer the second research question

The second research question of the studyasks whether, from the teacher's perspective, UDL is an effective method to include SID students with non-special educational needs students in the same classroom. After the experiment was completed, open questions were distributed to the 16 teachers who participated in the study. Table 20 shows the demographic variables of the teachers who participated.

Table 20: Demographic variables of the teachers

Demographic variables	**N**	**%**
Age		
29-٣٢	٦	٣٧.٥
٣٣-٣٥	٧	٤٣.٨
٣٧-٣٩	3	١٨.٧
Gender		
Female	16	100
During your teaching career, did you teach both intellectually disabled and general education students?		
Yes	15	93.7
No	1	6.3
The type of class you teach		
Inclusion classes	9	56.3
Special institutes for SID	7	43.7
Your current school		
High school	16	100
Your Current qualifications		
Bachelor	11	68.7
Postgraduate	5	31.3
There are enough computers to use effectively at your school	2	12.5

Demographic variables	N	%
No	14	87.5
Yes		
The number of years that teachers used computers for the purpose of education		
3-5 years	16	100
The number of years that teachers used the Internet for the purpose of education	16	100
3-5 years		

From the sample used, all 16 participants were females (100%). Education wise, 37.5% of the participants had attained a bachelor degree, and approximately 27.5% of them were 33 years old. All the participants had experience in teaching general education and intellectually disabled students. As seen, 50% of the participants had answered the question on the type of class they taught as being inclusion class in their allocated schools. Additionally, 62.5% of the participants were teaching in secondary schools. A good number of them thought that the computers in their allocated place of work (schools) were not effectively used as expected. All the 16 teachers used computers and the Internet as their teaching strategy and had an experience of more than two years.

4.3.1 The results of open questions for the experimental and control group (qualitative results)

After the completing the questionnaires, participants were asked to give their views on several open-ended questions about how UDL method fosters inclusion. Their responses were genuine and complete since they all had an interest in answering these questions.

Table 21 shows that all the participants provided an answer to the open-ended questions, with the 100% completion rate.

Table 21: Responses of the participants to open-ended questions

Question	Respondents	Percent
Q1. Achieving inclusion	16	100
Average		**100**

4.3.2 Question 1: Do you think that using UDL can help foster inclusion amongst non-special education and students with special needs? Why?

Participants responded to 11 open-ended questions at the end of the questionnaire. There was one question related to the inclusion of SID with SNSEN students. The researcher has collated all the teachers' answers from the open questions and then translated them from Arabic to English (see appendix 18). The researcher divided respondents' answers into two major themes, outlined in Table 22.

Table 22: The opinion of teachers about inclusion

Themes	Subthemes or Answer	Frequency	Percentage
I agree	The UDL helps to achieve inclusion between intellectually disabled students and non-special education students in the same class.	15	93.8
I agree somewhat	UDL is used in simple classes, but it is not used in scientific classes, such as chemistry, physics ... etc	٢	12.5

The table above shows the percentages and frequency of responses in each subtheme. It shows that most of those sampled thinks that UDL helps to foster inclusion (93.8%).

4.3.3 Results of the second question

The second question that this study tested asked whether UDL was an effective method, from a teacher's perspective, for integrating SID students with non-special educational needs students in the same classroom. The second hypothesis of the study suggested that UDL is an effective method in fostering the inclusion of SID students with non-special educational needs students in the same classroom from the teachers' perspective. To test this hypothesis,

the percentages and frequency of responses from teachers were used to explore the success of strategies designed to include SID and SNSEN students. The results showed that the use of UDL has a significant effect on the inclusion of SID students with students with non-special educational needs in the same classroom. It is clear from previous responses that most think that UDL fosters inclusion (93.8%).

4.4 Data analysis for the experimental and control group in answering the third question

The third question asks what the advantages, drawbacks and barriers are with respect to the implementation of the UDL method, from an observer's perspective and from a teacher's perspective. The sample included 16 participants from 4 mainstream high schools in Riyadh. (Four other teachers were excluded because they withdrew from the study.) Table 20, in (§ 4.3.3), has detailed the demographic variables of these participants.

4.4.1 The results of the experimental groups and control group in regard to the third question

The third question that this study asked was: What are the advantages and drawbacks associated with the implementation of the UDL method in the classroom, from an observer and teacher's perspective? With that in mind, the study sought to ascertain teachers' views to identify the benefits, disadvantages and challenges of implementing UDL in comprehensive schools, by focusing on eight teachers' opinions in the experimental group, which used the UDL method with students. Also, the views gained of eight teachers in the control group that did not apply UDL, but who had knowledge after the experimental study. Furthermore, the goal was to learn the difference between the views of those teachers who have applied UDL and the views of those who had not applied UDL but who have a general background understanding of its main principles. In the current study, normality was not measured for the sample. As the sample is small, the test from a non-parametric was selected. In addition, usually the sample average is used when the sample size is approximately 30 or larger.

To answer the third question, descriptive statistics were used. These included: means, standard deviations and scores ranges. Descriptive statistics can be obtained using

frequencies, description or in a number of different ways. The other reason why the descriptive statistics method was used was because the questionnaire does not study the relationships between variables or seek comparison between variables. For mor information see (§ 3.4)

Quantitative methods were used to collect data on 16 teachers' view of the advantages, disadvantages and obstacles they faced when applying UDL. A questionnaire was used. The questionnaire focused on six variables to measure the advantages, disadvantages and obstacles: engagement, representation, expression and action, understanding UDL, general barriers, and barriers after the application of UDL. The teachers took around 10-20 minutes to complete the questionnaire. Teachers' opinions of the advantages and obstacles were scored on a five-point scale: 1= Never, 2= Not very often, 3 = Often, 4 = Very often, 5 = Daily. Whereas, teachers' views of the barriers to applying UDL were scored on an eight-point scale.

The results are shown in Table 23: Descriptive statistics for mean and std. deviation of each variable in the two groups, with Figure 27 and Figure 28 showing that the teachers answered most of the items in the questionnaire and revealed the advantages, drawbacks and obstacles to applying UDL. The mean of each variable in both groups were: engagement = 3.0, representation = 3.5, expression and action = 3.5, understanding UDL = 3.0, general barriers = 3.0, and barriers after application of UDL = 3.0. Therefore, we conclude that the mean results between the variables in the control group and the experimental group are close because the average is between 3.0 and 3.5. However, when we look towards barriers after applying UDL, the control group seems to expect to face more challenges than the experimental group; the average after the experiment for the control group was 7.2, whereas for the experimental group it was 5.0. In this chapter, we will present more detailed results on each variable, showing the advantages, disadvantages and challenges of implementing UDL.

Table 23: Descriptive statistics for mean and std. deviation of each variable in the two groups

Sample		Engagement	Representation	Expression and Action	Understanding UDL	Barriers	Barriers after application of UDL
Experimental	Mean	3.1	3.6	3.6	2.7	2.9	5.0
	Std. deviation	.58	.80	.72	.68	.23	1.6
Control	Mean	3.0	3.3	3.2	3.3	3.1	7.2
	Std. deviation	.39	.61	.64	.60	.17	3.1
Total	Mean	3.0	3.5	3.5	3.0	3.0	6.0
	Std. deviation	.50	.71	.69	.69	.21	2.6

Figure 27: The experimental group mean for each variable

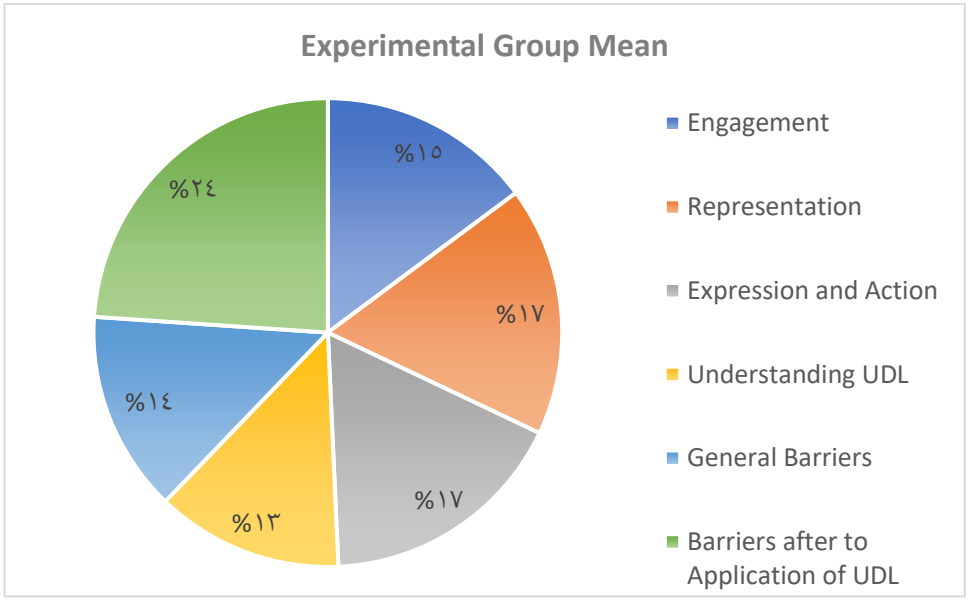
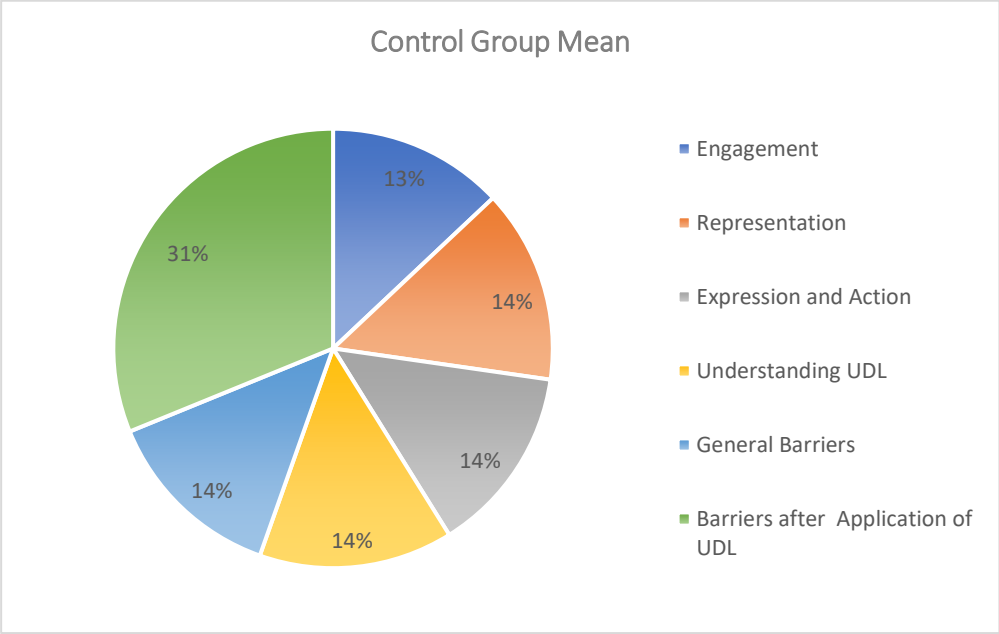


Figure 28: The control group mean for each variable



In order to calculate the correlation coefficient between the variables in the questionnaire (Engagement ،Representation ،Expression and Action ،Barriers ،UDL Knowledge ،Barriers to the Application), the Spearman rho correlation coefficient was used, because it is suitable for non-parametric tests (Pallant, 2013). The result is that there is a strong relationship between teachers' views on the variables Engagement, Representation, Expression and Action. The results showed that there is a positive relationship between these four variables, which sit between 0.5 and 0.8. On the other hand, there was a negative relationship between teachers' views on General barriers and Barriers after the application of UDL, which sit from -0.1 to -0.7. The findings in Table 24 state the results for each variable and confirm that there is a strong relationship in the Engagement variable in the second item "encourage students to work in small groups during class instruction" with a score of 0.56 *, and also the third item "provide online assignments" with a score of 0.72 **. In addition, there is a strong relationship in the Representation variable in the second item "provide information in alternative formats such as diagrams and charts" with a score of 0.68 **.

Table 24: Descriptive statistics of correlation coefficient between the two groups

Variables	1	2	3	4	5	6
1-Engagment Experimental Control	1	0.56*	0.72**	-0.20	0.2	-.059
2- Representation Experimental Control		1	0.68**	-0.31	-0.71	-0.32
3- Expression and Action Experimental Control			1	-0.01	-0.20	-0.10
4- Barriers Experimental Control				1	-0.30	0.30
5- UDL Knowledge Experimental Control					1	-0.14
6- Barriers to the application of UDL Experimental Control						1

4.4.2 Resulting benefits of engagement in the experimental and control groups

The findings in Table 25 indicate that teachers in the experimental group try to implement UDL principles through the creation of favourable learning exposure. For instance, they designed class activities that linked to students' interests (M= 4.0), at 75%, and provision of choices for accomplishing course activities in class (M= 3.8), at 50%. Occasionally, a few teachers would allow and encourage students to study out of class to enhance a better understanding of what they were learning (M= 1.8), at 12.5%.

For the control groups, the results illustrated that most of the teachers use educational methods to achieve all the UDL principles and to equip their learners with a simple way of understanding. For example, they encouraged students to use small groups for discussions (M= 3.8), at percentage 37%, demonstration lessons and role-playing amongst the students. Also, teachers would aid the students through a few activities like giving students online assignments and online teaching and they acted as a primary teaching technique (M= 2.4), at 12%.

Table 25: Descriptive statistics for Engagement

	Experimental Group		Control Group	
Statement	**M**	**%**	**M**	**%**
1. I use lecture as my primary teaching	**3.3**	**37.5**	**2.4**	**12**
2. I encourage students to work in small	**3.3**	**37.5**	**3.8**	**37.5**
3. I offer online assignments	**2.5**	**25**	**2.4**	**12**
4. I allow students to choose activities that	**3.2**	**50**	**2.7**	**62.5**
5. I encourage students to communicate online or face to face to discuss the course	**2.2**	**12.5**	**3.0**	**25**
6. I try to design class activities that match	**3.8**	**50**	**3.7**	**25**
7. I encourage students to study in groups	**1.8**	**12.5**	**2.8**	**12.5**
8. I provide opportunities to build student	**3.3**	**37.5**	**3.0**	**12**
9. I provide choices for completing course activities in class	**4.0**	**75**	**3.0**	**12.5**
Average	**3.1**	**37.5%**	**3.0**	**22%**

4.4.3 Resulting benefits of representation for experimental and control groups

The second section of the questionnaire, which focused on providing multiple types of representation,

Table 26, led to the following results for the experimental group. The most common response of teachers was that they present information in a variety of ways (verbal, visual, auditory, tactile) (M= 4.2), at 62.5%. On the other hand, fewest of teachers said that they encouraged students to use online resources and websites to learn class information (M= 2.8), at 12%.

The second section of this questionnaire, which focused on providing multiple types of representation, led to the following results for the control group: (M=4.2), at 62.5%. Most teachers answered that they presented information in a variety of ways (verbal, visual, auditory, tactile). A few of the teachers said that they used digital or electronic based multimedia books in their teaching (M= 2.6), at 12%.

Table 26: Descriptive statistics for Representation

	Experimental Group		Control Group	
Statement	**M**	**%**	**M**	**%**
1. I present information in a variety of ways (verbal,	**4.2**	**62.5**	**4.2**	**25**
2. I clearly identify the essential concepts in	**3.8**	**37.5**	**3.6**	**37.5**
3. I provide information in alternative formats such	**3.2**	**50**	**3.5**	**12.5**
4. I provide a summary of each lesson	**3.0**	**12.5**	**3.8**	**37.5**
5. The materials I use are captioned	**3.5**	**12.5**	**4.0**	**12.5**
6. I use Digital or Electronic-based multimedia	**3.7**	**37.5**	**2.6**	**12**
7. I offer students access to multimedia resources	**3.6**	**50**	**3.7**	**50**
8. I encourage students to use online resources and	**2.8**	**12**	**3.1**	**25**
9. I provide software applications that students can use in their learning	**3.5**	**25**	**2.7**	**25**
Average	**3.6**	**33%**	**3.3**	**26%**

4.4.4 Resulting benefits of action and expression for experimental and control groups

In this section, teachers from the experimental group provided the learners with the steps required for completing the assignment, also, they offered guidelines to learners on how to complete their major courses successfully (M= 4.2), at 62.5%. A few teachers provide several assignments which include the use of modern media and sources like videos, presentations and written materials (M= 2.0), at 12.5%.

Alternatively, according to the results, teachers in the control group provided students with activities to demonstrate their knowledge in various ways (M= 4.3), at 73.5%. Only a few teachers provide models and example projects to guide their learners. Additionally, teachers allow students to make their own choices in how they complete their courses (M= 2.5), at 12% (see Table 27).

Table 27: Descriptive statistics for Action/Expression

	Experimental		Control Group	
Statement	**M**	**%**	**M**	**%**
1. I provide multiple types of assignments that include various types of modern media (e.g. written materials, podcast, presentation, videos).	**2.0**	**62.5**	**3.5**	**50**
2. I encourage students to self-monitor their own behaviour outcomes so that students	**4.0**	**25**	**3.7**	**25**
3. I encourage students to use technology (e.g. laptops, tablets) in class for	**3.6**	**12.5**	**3.6**	**12.5**
4. I provide activities for students to demonstrate their knowledge in multiple	**4.1**	**37.5**	**4.3**	**73.5**
5. I provide an outline of the steps required to complete the assignments	**4.2**	**25**	**3.5**	**25**
6. I provide models or examples of class projects and assignments teaching interests.	**3.5**	**50**	**2.5**	**12**
7. I allow students to make their own choices in how they complete	**3.1**	**37.5**	**2.5**	**12**
8. I provide clear guidelines for how to successfully complete all major courses	**4.2**	**62.5**	**4.0**	**50**
9. I clearly identify the scoring methods for all major course assignments before giving the students the assignment	**3.5**	**50**	**3.0**	**12.5**
Average	**3.6**	**40%**	**3.2**	**30%**

4.5 Barriers to implementation in experimental and control groups

A purpose was to fully understand the barriers of implementing UDL into the mainstream high schools in KSA. The results indicated in both experimental and control groups that many teachers gave a response that the common challenge found in most schools was limited access to the Internet (M= 4.2), at 75.5%. In addition, they claimed that their great barrier is that they had neither an understanding nor enough experience to use technology in the classrooms (M= 2.0), at 12.5%. However, a few teachers insisted that the use of technology

in classrooms would cause disturbance to the students and disruption of studies (M= 2.0), at 18 % in the experimental group, and (M= 1.7), at 12.5% in the control group, as explained in Table 28.

Table 28: Descriptive statistics for Barriers to implementing UDL

	Experimental Group		Control Group	
Statement	**M**	**%**	**M**	**%**
1. I don't understand UDL	**2.2**	**12.5**	**3.3**	**37.5**
2. I know the basics of UDL but not how to implement it	**3.2**	**37.5**	**3.6**	**50**
3. I don't have understanding for how to use technology in my classroom	**2.0**	**12**	**2.0**	**12**
4. Lack of overall professional development on new things in education	**3.1**	**25**	**3.8**	**25**
5. There's not enough technology hardware (e.g. laptops, tablets, etc.) in my school	**3.1**	**25**	**3.8**	**37.5**
6. There's limited access to the Internet in my school	**4.2**	**75**	**4.7**	**75.5**
7. Technology reduces my contact with students	**2.2**	**12.5**	**2.3**	**37.5**
8. My students don't have the necessary technological skills to use it in their own learning	**2.8**	**37.5**	**3.6**	**12.5**
9. The use of technology in class is a disruption	**2.0**	**12**	**1.7**	**12**
Average	**2.9**	**27%**	**3.1**	**33%**

4.5.1 Barriers: Understanding of UDL in the experimental and control groups

In the second part of the questionnaire, there were 15 multiple choice questions, which sought to measure teachers' understanding of UDL after they had received training. Thus, they seek to identify the obstacles they face in understanding this method. It is clear from Table 29 that the scores of the teachers in the experimental group are higher than those in the control group. In the experimental group, the average was 0.4 degrees, at 85%, but 0.2 in the control group, at 60%. This suggests that the control group faced an obstacle to understanding the UDL method and they need practical training to increase understanding. From the short review above, we can point towards a number of key findings concerning

barriers to understanding UDL in Saudi Arabian mainstream high schools. For the barriers from the teachers' perspectives who are in the experimental group, the results were as follows. The most frequent responses were that teachers cannot define the UDL concept. Also, they do not understand how to communicate information and the strategies that are used to teach students using UDL (M= .50), at 50 %. The teachers said the least frequent barrier was a failure to understand how UDL can help to communicate information in the brain (what to learn, how to learn, where to learn?) (M= 0.0). Teachers also find it difficult to use technology in the classroom (M= 2.0), at 12.5%.

In the control group, the most frequent teacher responses showed that teachers were unable to understand UDL because of a number of reasons: the concepts and elements implicit in UDL; the steps involved in its implementation; and difficulties understanding the theoretical framework behind UDL (M= .37), at 62%. The least frequent teacher responses were that teachers lack general information about UDL as an instructional strategy. Also, they lack information on the importance and extent of UDL's influence when teaching students. Furthermore, teachers do not have information on how to connect information to the brain networks of the student (M= 0.0). The results are shown in Table 29.

Table 29: Descriptive statistics for Understanding UDL

	Experimental Group		Control Group	
Statement	**M**	**%**	**M**	**%**
1. Universal Design for Learning (UDL) has..	**.87**	**12.5**	**.87**	**12.5**
2. The critical elements of UDL..	**.87**	**12.5**	**.62**	**62.5**
3. Instructional Planning Process of UDL goes through..	**.75**	**25**	**.62**	**62.5**
4. Recognition Networks is..	**.25**	**25**	**0.0**	**0**
5. Affective Networks is..	**.50**	**50**	**.12**	**12.5**
6. Strategic Networks…	**.50**	**50**	**.12**	**12.5**
7. Universal Design for Learning (UDL) is ..	**.12**	**12.5**	**0.0**	**0**
8. UDL works better for..	**.87**	**12.5**	**0.0**	**0**
9. Learner "variability" refers to…	**.75**	**25**	**.25**	**25**
10. Learning goals refer to….	**.62**	**37.5**	**.25**	**25**
11. When using the UDL framework, context is important because….	**.25**	**75**	**.62**	**62**
12. A learning "context" Includes…	**.50**	**50**	**.37**	**62**
13. Affect:	**.12**	**12.5**	**0.0**	**0**
14. The recognition network of the brain..	**0.0**	**0**	**0.0**	**0**
15. My undressing of UDL in general is…	**.12**	**12.5**	**0.0**	**0**
Average	**2.7**	**0.4**	**3.3**	**0.2**

4.5.2 Barriers: Teachers acceptance after application of UDL for experimental and control groups

The results showed that, for the experimental group, the most frequent barrier when applying UDL is that teachers like to modify their use of UDL based on the experiences of the students (M= 8.2), at 90%. However, the least frequent barrier was that teachers were not concerned about UDL (M= 1.6), at 12.5%.

According to the teachers' expectations in the control group results, the barriers were many and needed several improvements. The teachers complained about their students having a negative attitude toward UDL. Also, they recommended a developed and better working relationship with other teachers within their school who used UDL. Additionally, they

requested a chance to discuss the possibility of using and implementing UDL. If they would, they had an interest in knowing whether there were available resources that would allow them to apply UDL fully. Also, they needed to know the UDL requirements and its management, about the UDL commitments, time management and roles required (M= 3.5), at 50%. The least cited barriers were reflective of that those teachers were not interested in learning about UDL (M= 1.4), at 12.5% (see Table 30).

Table 30: Descriptive statistics for barriers after the application of UDL (CBAM) (Hall & Hord, 1987).

	Experimental Group		**Control Group**	
Statement		**%**	**M**	**%**
I am concerned about students' attitudes toward UDL.	**1.1**	**12.5**	٣,٥	**50**
I now know of some other approaches that might work better.	١,٨	**12.5**	٢,١	**12.5**
I don't even know what the UDL is.	٢,٨	**25**	٢,٢	**25**
I am concerned about not having enough time to organize myself each day.	٢,٨	**25**	٢,٧	**25**
I would like to help other teachers in their adaptation of UDL.	٣,٦	**50**	٣,٢	**37.5**
I have a very limited knowledge about UDL.	٢,٠	**25**	٢,١	**25**
I would like to know the effect of reorganization on my professional status.	٣,٦	**50**	٣,٤	**50**
I am concerned about conflict between my interests and my responsibilities.	١,٨	**12.5**	٣,٠	**37.5**
I am concerned about revising my use of UDL.	٢,١	**25**	٣,٢	**37.5**
I would like to develop working relationships with both our teachers and outside teachers using UDL.	٣,٥	**50**	٣,٥	**50**
I am concerned about how UDL affects students.	**3.1**	**37.5**	٣,٢	**37.5**
I am not concerned about UDL.	١,٦	**12.5**	١,٧	**12.5**

I would like to know who will make the decisions in the new system.	٣,٨	**50**	٣,١	**37.3**
I would like to discuss the possibility of using UDL.	**3.3**	**37.5**	٣,٥	**50**
I would like to know what resources are available if we decide to adopt UDL.	٤,٠	**75**	٣,٥	**50**
I am concerned about my inability to manage the requirements of UDL.	٢,١	**25**	٢,٤	**25**
I would like to know how my teaching or administration is supposed to change.	٣,٨	**50**	**2.**٣	**25**
I would like to familiarize other schools or persons with the progress of this new framework.	٣,٦	**50**	٣,١	**37.5**
I am concerned about evaluating my impact on students.	٣,٨	**50**	٣,٢	**37.5**
I would like to revise the UDL instructional approach.	٢,٣	**25**	٢,٤	**25**
I am completely occupied with other things.	٢,٠	**25**	١,٧	**12.5**
I would like to modify our use of UDL based on the experiences of our students.	**8.**٢	**90**	٣,٢	**37.5**
Although I don't know about UDL, I am concerned about things in this area.	٣,٣	**37.5**	٢,٤	**12.5**
I would like to excite my students about their part in this approach.	٣,٦	**50**	٣,٢	**37.5**
I am concerned about time spent working with non-academic problems related to UDL.	٢,٨	**25**	٣,١	**37.5**
I would like to know what the use of the UDL will require in the immediate future.	٣,٦	**50**	٣,٢	**37.5**
I would like to coordinate my effort with others to maximize the effects of UDL.	٣,٨	**50**	٣,٢	**37.5**
I would like to have more information on time and energy commitments required by UDL.	٣,٨	**50**	٣,٥	**50**
I would like to know what other teachers are doing in this area.	٣,٨	**50**	٣,١	**37.5**
At this time, I am not interested in learning about UDL.	١,٦	**12.5**	١,٤	**12.5**

I would like to determine how to supplement, enhance, or replace UDL.	٢,٣	**25**	٣,٠	**37.5**
I would like to use feedback from students to change the programme.	٣,٨	**50**	٣,١	**37.5**
I would like to know how my role will change when I am using UDL.	٣,٨	**50**	٣,٥	**50**
Coordination of tasks and people are taking too much of my time.	٣,٠	**37.5**	٢,٧	**25**
I would like to know how this UDL is better than what we have now.	**3.6**	**50**	٣,٤	**50**
Average	**5.0**	**40%**	**7.2**	**34%**

4.6 The results of open questions for the experimental and control group (qualitative results)

At the end of the questionnaire, participants had a choice of responding to each of the open-ended questions. The main aim of these given questions was to uncover the participants opinions based on the merits and demerits of using the UDL.

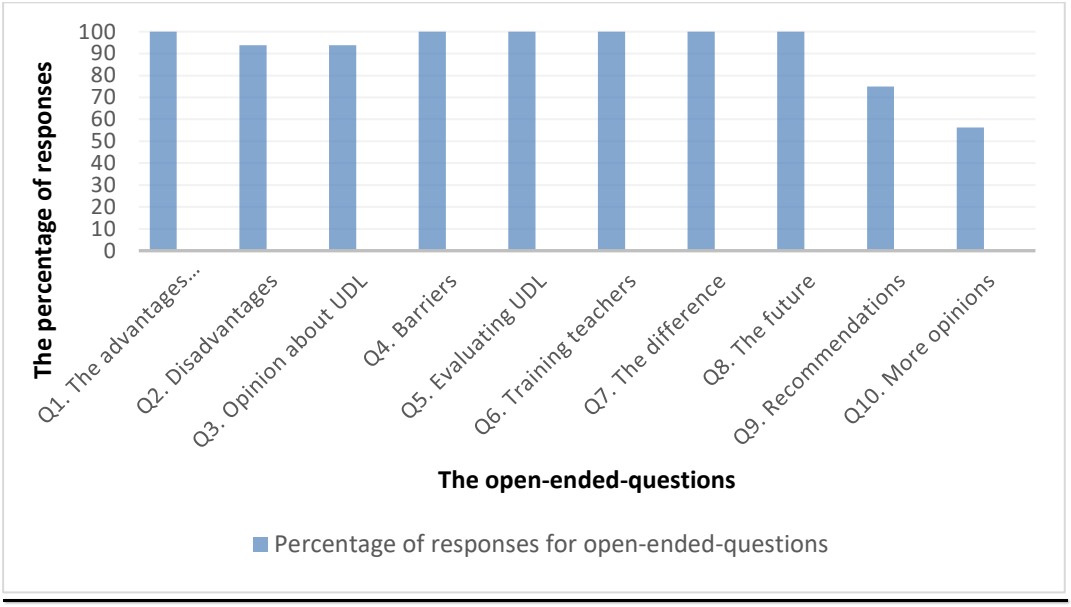
Table 31: Responses of participants to open-ended questions

Question	Respondents	Percent
Q1. Advantages of using UDL	16	100
Q2. Disadvantages	15	93.8
Q3. Opinion about UDL	15	93.8
Q4. Barriers	16	100
Q5. Evaluating UDL	16	100
Q6. Training teachers	16	100
Q7. The difference	16	100
Q8. The future	16	100
Q9. Recommendations	12	75
Q10. More opinions	9	56.3
Average	10	**92.7**

Table 31 is used to show how each participant responded to the questions they were asked. Participants responded to 11 open-ended questions at the end of the questionnaire. There were ten questions related to advantages, disadvantages and challenges faced when applying UDL. 100% of teachers answered the first, fourth, fifth, sixth, seventh and eighth questions. For the second and third questions, teachers responsed 93.8% of the time, for the ninth question 75% answered. Lastly, with the 10th question, the response rate was 56.3%.

The process used to analyse the open-ended questions: the researcher has collated all the teachers' answers from the open questions, then translated them from Arabic to English (see appendix 18). The researcher divided respondents' answers into themes, according to the questions. Then, each theme was divided into subthemes. The frequency and percentage of each subtheme was counted. To see the highest frequencies, refer to Figure 29: Percentage of responses for open-ended questions

Figure 29: Percentage of responses for open-ended questions



4.6.1 Question 1: What are the advantages of using UDL in teaching?

UDL has various advantages which were given by different participants in both groups (experimental and control). The researcher made the review much easier by dividing the question into themes and subthemes. The number of themes was five whereas that of the subthemes accumulated to eleven. There were also findings that were similar for most participants, which made up the key findings. The key advantage of UDL is that it brings about an environment where new methods can be used in teaching. This was given by approximately 56% of the respondents. Some seemed to believe UDL helped in the integration of students who had general education (31.2%). The least number thought UDL supplements their teaching approaches and supplementes the technologies that are out of date with the new ones (25%) **(**see Table 32).

Table 32: Advantages of using UDL in teaching

Themes	Subthemes or Answer	Frequency	Percentage
Educational environment	Creating an interactive environment.	9	56.2
Engagement	Useful for including students with general education.	٥	31.2
	Gives all students the right to education without discrimination.	3	18.8
Solve educational problems	Improving understanding of students whilst also considering individual differences.	4	25
Developing teaching methods	Using new and varied teaching methods.	9	56.2
	Use of new technology and exchange of old ways of teaching with new ones.	4	25
	Helps to create engagement between students and being confident with education.	3	18.8
	Organizing ideas.	3	18.8
	Makes learning more powerful.	1	6.3
	Uses interesting teaching methods and teaching based on cooperation.	1	6.3
	UDL is suitable for students of general education and special education.	1	6.3
	Effective method of teaching, but not with all materials or lessons.	1	6.3
Solve staff problems	Reduce teacher effort	١	6.3

4.7 Disadvantages of using the UDL programme

4.7.1 Question 2: What are the disadvantages of using UDL in teaching?

According to the participants' responses to this question, the researcher divided their answers into five major themes and eight subthemes, stated as follows in Table 33.

Table 33: Explanation of disadvantages of using UDL in teaching

Themes	Subthemes or Answer	Frequency	Percentage
Environmental problems	Some required methods and facilities are not available for public schools.	5	31.2
	The maximum number of students in the class must be 15.	3	18.8
	There is no suitable environment for the UDL program.	1	6.3
Team collaboration	Increasing private education teachers' duties.	5	31.2
	Absence of interaction between special education and public teachers to implement this program.	5	31.2
Financial requirements	Lack of required types in all public schools.	3	18.8
Other problems	Much time and effort must be exerted to collect and prepare the material to be delivered to students.	5	31.2
	UDL is used with simple materials or lessons, but it is not used with scientific lessons, such as chemistry, physics ... etc.	2	12.5

These are important findings on the disadvantages of using UDL. It is clear that 31.2% feel that the required technology and facilities are not available in public schools. This may include iPads, e-books and or software in Arabic. We can also see that 31.2% feel that UDL raises their workloads.

In addition, the results show that 31.2% of teachers shared the view that there is no interaction between special education and public teachers when implementing the UDL programme. Lastly, we can see that much time and effort needs be exerted to collect and prepare the material to be delivered to students. 31.2% had this view.

4.7.2 Question 3: What is your opinion about using UDL with respect to cost, time spent, and efforts exerted during planning and designing?

The answers given to the researcher were divided into three themes and three subthemes. From Table 34 it can be observed that a large majority of 81% felt that UDL required a lot of time as well as finances. While half the number of participants suggested that UDL takes a lot of time for application and implementation.

Table 34: Teachers' opinion about using UDL with respect to cost, time spent and efforts exerted during planning and designing

Themes	Subthemes or Answer	Frequency	Percentage
Cost	It requires large amounts of money.	13	81.2
Time spent and effort	It requires considerable time to be implemented and applied.	8	50
Recommendation	A good idea would be for UDL to be adopted by the ministry.	1	6.2

4.8 Challenges and obstacles that interrupt the use of UDL in teaching

4.8.1 Question 4: Can you explain the challenges and obstacles that you face when using UDL in teaching?

According to the participants' responses to this question, the researcher divided their answers into four major themes and twelve different subthemes. These are presented in Table 35, Table 36 and Table 37.

A. Financial challenges (e.g. cost)

B. Environmental obstacles (e.g. there are no computers available, etc.)

Table 35: The challenges and obstacles that teachers face when using UDL in teaching

Themes	Subthemes or Answer	Frequency	Percentage
Financial challenges	The high cost.	8	50
	There are no smart devices in schools to help implement and apply the program.	7	43.8
	There are no obstacles or challenges.	2	12.5
	Lack of official patronage for design.	\	6.3
Environmental obstacles	Classes were not well prepared for/ there were not enough computers available for all students.	10	62.5
	There was no-one available to maintain the computers.	6	37.5
	There were no obstacles or challenges.	1	6.3
	Students did not know how to use computers.	\	6.3

Table 35 shows teachers' opinions about the financial obstacles faced. 50% feel that the cost involved is too high. 43.8% said that there were no smart devices in the school that could be used to help implement and apply the programme.

Those findings also show that 62.5% feel that classes were not well prepared for, in terms of resources, technology and staff numbers. It was also felt that there were not enough computers available for students. Because both SID and SNSEN students were bought together in the computer room, it was felt that there was an increase in the usual number of students. 37% felt that there was no-one available to maintain the computers.

C. Students problems (e.g. behaviour, etc.)

Table 36: Students' problems with UDL

Theme	Subthemes or Answers	Frequency	Percentage
Student problems	There are no problems.	7	43.8
	There is sometimes no cooperation between non-special education students.	3	18.7
	There are problems with parents because of insufficient awareness/ the parents of non-special education students see that special education students are considered inferior.	٢	12.5
	Facing problems with parents of public education students.	١	6.2
	Parents with special needs refuse to cooperate with their children in resolving duties such as duties that require computer use or social networking.	١	6.2

Table 36 shows that the teachers had opinions on the problems that these students were facing, and it was clear that most thought no problem existed between SNSEN and SID students (43.8%). According to the results of the findings, only a small number of respondents felt that no cooperation existed in students with educational needs that were not special (18.7%). Each teacher gave their opinion on this matter whereby each opinion was highly considered.

d. Problems with school staff

Table 37: Problems with school staff when using UDL

Theme	**Subthemes or Answers**	**Frequency**	**Percentage**
Problems with the school staff	There is no cooperation between general education teachers and school personnel.	8	50
	There are no problems with employees.	8	50
	There is a deterrent from the leadership and departments.	١	6.2

Table 37 shows the opinions given by the teachers concerning the staff and the schoolteachers, which bring a conclusion that most of these problems were more based on the staff. Only 6.2% thought that the leadership and department in the school were to blame for these problems. This was a reason for the refusal of inclusion the SNSEN and SID in several schools.

4.9 Evaluating the use of UDL in teaching from the teacher's point of view

4.9.1 Question 5: Do you feel that UDL can be used as a basic programme for training students in the field of vocational habilitation? Or do you consider it an auxiliary one? Why?

According to the participants' responses to this question, the researcher divided their answers into two major themes and two subthemes. These are presented in Table 38.

Table 38: Opinion of teachers about evaluating the use of UDL

Themes	Subthemes or Answer	Frequency	Percentage
Basic programme	UDL can be used as a basic teaching programme because it is suitable for all classes.	14	87.5
Auxiliary programme	UDL is a sub-programme and more time is needed to define for collaboration between all staff in the school.	٢	12.5

The results show that 87.5% of teachers feel that UDL can be used as a basic programme.

4.9.2 Question 6: Do you think teachers must be intensively trained on how to use UDL?

According to the participants' responses to this question, the researcher divided their answers into one major theme and one subtheme, stated as follows in Table 39.

Table 39: Opinion of teachers about training to use UDL

Themes	Answer	Frequency	Percentage
I agree	The UDL method requires training and practice, because it needs practical rather than theoretical application through the preparation of workshops and exchange of experiences.	16	١٠٠

As is seen in the above table, 100% of respondents thought that the UDL method requires training and practice.

4.9.3 Question 7: What is the difference between normal teaching strategies and UDL?

There are differences between UDL and the normal strategies in teaching. A table was constructed to show what the teachers thought about the usual strategies, with the opinions again being categorised into themes and subthemes. The results indicate that UDL depends on three major strategies rather than the few strategies used in the usual approach in teaching. The normal teaching strategies were rated as boring according to 68.7% of the total number of participants, whereas 43.8% rated UDL as a good strategy and one that is considerably loved. In addition, 25% understood that the tutor was very important when it came to normal strategies of learning. In conclusion, the majority of people rated UDL as an aid to inclusion, with 6.2% thinking that it should be considered by every individual and 25% reported that students had a choice to decide the course, teacher and material. These points are presented in Table 40.

Table 40: The difference between normal teaching strategies and UDL

Themes	Subthemes or Answer	Frequency	Percentage
Usual teaching strategies	The methods and techniques used to deliver information took one or two forms.	11	68.7
	It is boring.	11	68.7
	In normal teaching, the teacher is the main teaching element.	4	25
Teaching with using UDL	There are more than three methods and techniques used to deliver information.	7	43.8
	It is interesting.	7	43.8
	It achieves inclusion.	5	31.2
	When using UDL, there is room to choose the teacher, the material, and the orientation course only.	4	25
	It is more organized, comprehensive, and makes it easy for the teacher to deliver information.	2	12.5
	It benefits all levels and is suitable for individual differences.	1	6.2

4.10 Thinking about the future

4.10.1 Question 8: Do you look forward to using UDL in the future? Why?

According to the participants' responses to this question, the researcher divided their answers into three major themes and three subthemes, as presented in Table 41.

Table 41: Opinion of teachers about using UDL in the future

Themes	Themes or Answer	Frequency	Percentage
Agree	I will use the UDL method in the future because it is an interesting tool and the results are effective for students.	14	87.5
Disagree	I do not want to use UDL at this time, because of the lack of adequate technological types.	2	12.5
I agree somewhat	I will use this method after receiving adequate training.	٢	12.5

The findings show that 87.5% of teachers will use UDL in the future, because of its effect on students. However, 12.5% of teachers did not wish use UDL in the future because they believe that there is a lack of adequate technological types. In other words, it is costly and they need more time in the lessons. Ultimately, the results show that there were some teachers who are neutral towards using UDL in the future. And teachers who believed that they will use UDL after they receive adequate training, because it is hard to understand the meaning of UDL from only one or two applications.

4.10.2 Question 9: What are your future recommendations to improve the use of UDL in teaching?

Based on the participants, and their opinion on each question, the answers were divided into two themes as well as six subthemes. The recommendations are given by the teachers on how to make improvements on the uses of UDL while teaching in the days to come. The results concluded that if teachers are regularly trained in several sessions, then they will be in a better position to deliver.

Some felt that the teachers should also be supportive in this process and pay attention to the leaders. The participants supported the idea that the ministry should support this process and to allocate sufficient resources (25%). The teachers, in this case, would help in preparing the UDL plus other technology associated with it in various workshops to educate people on how the smart technology worked (18.8%). There were also some teachers who acknowledged the importance of smart technology and computers as a whole (6.2%). The teachers would make a great team, as shown in the points presented in Table 42.

Table 42: Recommendations for the future use of UDL in teaching

Themes	Subthemes or Answer	Frequency	Percentage
For the ministry	The ministry cooperates with the teacher in terms of providing adequate types and budgets.	5	31.3
	The ministry pays for the design of this programme.	4	25
For the teachers	The teacher cooperates with the leaders and other organizing authorities.	5	31.3
	Improving the teachers' abilities through organizing frequent and regular training sessions.	5	31.3
	Preparing the teachers to use UDL and technology.	3	18.8
	Preparing the teachers and the classroom environment.	١	6.2

4.10.3 Question 10: Would you like to add any other opinions?

Table 43: Other opinions

Answer	Frequency	Percentage
They gave thanks for the research.	8	50
They do not have any additional opinions.	8	50

Table 43 shows that 50% would like to offer thanks to the research, and with 50% not having any additional opinions to provide.

4.11 Conclusion

This chapter has presented the results which have emerged as a result of the questionnaire, observation lists, open-end questions, and pre- and post-tests. Aside from the potential challenges, the overall impression of the effect of the UDL is positive. The results of the students indicate that there is a statistically significant difference between the control and experimental groups in the pre- and post-tests. The students who used UDL to learn photography developed more quickly than those in the control group. The opinions of

teachers also confirmed that UDL helps with inclusion of the SID and SNSEN in the same classroom (93.8%). Besides, the results explain that the teachers revealed the advantages, drawbacks and obstacles to applying UDL in the engagement, representation, expression and action, understanding of UDL, and barriers after the application of UDL. The results indicated that the variables in the control group and the experimental group are close because the average is between 3.0 and 3.5. However, when we look towards barriers after applying UDL, the control group seems to expect to face more challenges than the experimental group, with the average result being 7.2.

Further information on the results of the students and the teachers' opinions will be discussed in the next chapter.

5 CHAPTER FIVE: DISCUSSION OF RESULTS

The motivation for this study originated in the results of previous research that has linked the importance of the universal design for learning (UDL) framework, to the process of teaching both special education needs (SEN) and non-SEN students in North America and European countries. Most prior studies have confirmed the effectiveness of UDL in facilitating curricula and developing academic skills that facilitate the integration of special needs students in mainstream schools. However, Saudi educators lack strategies to help mainstream students with intellectual disabilities (SID). In addition, research has tended to focus on the development of academic skills rather than the development of professional skills. Despite that the UDL can help SID students to improve their learning by interacting with their peers, it has not yet been applied in Saudi schools with SID and non-SEN. This study examines the effect of UDL on teaching photography skills to SID and explores the obstacles to practical application of this method.

This chapter discusses the results of applying UDL to SID and non-SEN students in an integrated photography class, focusing on teachers' opinions about the importance of UDL and the advantages and disadvantages of UDL, and uses these findings to evaluate whether UDL can help integrate SID and non-SEN students in the classroom.

5.1 The first research question

What is the effect of using UDL on teaching professional photography skills in vocational Programmes for SID?

Students' preferred teaching methods: Experimental group. The data revealed that eight of the students preferred visual modes of learning, including through video and computer technology, and that virtually all students liked all methods of support offered, including physical, symbolic, and moral support, as well as all types of evaluation, such as through the use of technology when completing homework, face to face evaluation, and participation in group activities. However, the SID students 1 and 2 did not prefer using sound and poems when learning, while students 4 and 6 did not prefer answering questions in front of others as a means of evaluation. These findings suggest that it is ideal to design the curriculum to suit the needs of all students based on students preferred methods of learning and evaluation, which is one of the foundational aspects of applying UDL. A popular explanation is that the benefits of a choice of teaching aids and methods include effectively ensuring that

teachers are able to institute a teaching strategy that aligns with the learning environment. According to Eather, Riley, Miller and Jones (2017), other benefits of students' choice of teaching aids and methods include students being motivated via enhancing their engagement, improving their attention and emphasis being aligned with not only remembering the course materials but also comprehending it. For example, evaluating students 4 and 6 by answering questions in front of others can provide inconclusive outcomes. Additionally, teaching based on a student's preferred choice of aids ensures that educators are able to simplify and organize complex course materials. Regarding the relationship between student choices with effective education, effective teaching is grounded on the notion of making the learning experience more engaging and practical, as this will ensure active participation of the students, and hence the need to utilize students' preferred choices of teaching aids and methods.

Regarding teachers' understanding of UDL, the results showed that all teachers failed to apply most UDL principles in the first and third sessions, but that between the third and fifth sessions, they applied all UDL principles successfully. Non-use of UDL principles among teachers was consistently due to an initial inability to understand the strategy. These results clearly show that it takes time for teachers to learn how to use the UDL method, which requires effective training that focuses on explaining theoretical concepts. These findings agree with those of Shah (2012), who also found that teachers failed to understand UDL concepts. That study demonstrated that 134 directors of education in 14 states in the United States failed to understand UDL concepts, despite their belief in the importance of this method. The Shah study was a widespread analysis of special education schools in the United States, where UDL is a well-known approach to education. In contrast, the present study was applied to only four schools in Riyadh and involved sixteen special education teachers. The main difference between this study and the Shah study lies in the fact that schools in Saudi Arabia have not implemented UDL, which is not well-known as a teaching method. In fact, the present study is the first to explore the implementation of UDL in Saudi Arabia. Indeed, there should be greater emphasis on teaching UDL to future teachers in Saudi Arabia to ensure that it is successfully implemented.

5.2 Teaching methods and evaluation and presentation of information to the two groups

5.2.1 Teaching methods in the experimental group

The findings revealed that teachers rely on various methods to transmit information and knowledge to their students. The methods used varied from audio technologies, videos, cameras, printers and paper, computers, iPads, and smart boards. Teachers also designed Programmes to address the needs of both SID and non-SEN students. Specifically, teachers designed software called “learning photography with us”. The current software is designed to suit the needs of students with SID and non-SEN, as explained in the methodology chapter (§ 3.6). This software helps with the learning of photography by both the SID and non-SEN at the same time, and this is different from the software that was used in Coyne et al.’s study (2012). In addition, the current software is characterized by trying to convert or simplify the practical skills of photography into learning skills that are easy for the student to learn. Such as explaining the parts of the camera and the steps of operating the camera pictures and videos, then the students have to apply what they learned on the camera in practice.

The results of the observation lists indicate that students were enthusiastic when using the software, as the software was the first choice for most students among a number of activities. It is probable that the software has attracted the attention of students because it contains many means of communicating information (images, videos, stories, etc.), and a multiple of assessment methods (written, multiple-choice, and voice recording).

This software is similar to that discussed in the study by Coyne et al. (2012). For more information on the similarities and differences between the current software and that used by Coyne et al. (2012), see (§ 2.6). There are marked differences between the software used in this study and that discussed in Coyne et al. (2012). First, while the software of the present study was designed to teach photography to SID, the software used in Coyne et al. (2012) was designed to teach reading skills to SID, and used different materials (e-book, letter- and word-recognition software). It also should be noted that the findings from the Coyne and colleagues’ study are more relative to academic skills than those of the current study. In their study, the experimental group that learned via UDL made significantly greater gains in reading comprehension than the experimental group in the present study made in terms of acquiring photography skills. Still, in this study, there was a marked difference in students' performance between the pre- and post-instruction test for the experimental group, and this

difference might have been clearer if this experiment had included more academic skills alongside with the professional skills.

The main distinction between this study and that of Coyne et al. (2012) lies solely in subject matter: the Coyne and colleagues' study aimed to teach reading skills, while the present study sought to teach photography. Coyne and colleagues may have been more successful because it was easier to convert the reading curriculum into interactive software, though, for instance, the interactive pronunciations and repetitions of words, audio versions of the text, and progressive evaluation questions (Coyne et al., 2012). By contrast, photography skills, which require students to learn more motor skills than cognitive concepts, are more difficult to convert into an interactive program. Although most studies show that learning academic skills, such as reading, writing, and mathematics, is more difficult than learning motor skills (Watson and Gable, ٢٠١٠; Dweck et al., 2014), the results of the current study concluded the opposite. Therefore, this study urges researchers to understand the difference between applying UDL to teaching professional or motor skills and applying them to academic education, as discussed in the following paragraph.

One of the three UDL principles was clearly achieved in this study, namely that of "representation". Representation consists of providing learners with multiple means of acquiring new facts and knowledge in ways that are acceptable and sufficiently flexible for a variety of learning styles (CAST, 2015). Specifically, the results of this study showed that teachers used most of the available means to teach students photography skills, at the rate of six to nine learning methods per lesson. In light of these findings, we can see that Piaget's concept of the "what" of learning has been achieved because the information was transmitted to students via multiple channels to help them interpret, classify, and identify the facts (Center for Training Enhancements, 2015). These findings support the research of Coyne et al. (2012), who found that the use of multiple modes of presentation (such as sound and animation) increased the rate at which students absorbed new information. Similarly, digital technologies are widely used to enhance student achievement and promote greater interaction (Moody et al., 2010). De Jong and Bus's (2004) study used print books, animation, flash cards or pictures, 3D, and videos. The findings of the present study support their conclusion that teachers should use multiple teaching media. For example, in this study, teachers used a UDL-designed computer program, cameras and holders, printers, iPads, smart devices, video clips, PowerPoint presentations, flash cards and photos, magazines and

brochures, and computers. Still, it should be noted that there are limitations to this approach, chief among them is its high cost. Moreover, this kind of multimedia UDL approach entails a lengthy design process (Hall et al., 2012).

It is important to know that the educational software for this study is designed as one of the tools under the UDL method because the main objective of this study is to know the effect of UDL on improving the skill of photography. Therefore, it remains unclear what is the impact of this software in particular and when expanded on photography education for non-SEN and SID students.

5.2.1.1 Teaching or presentation methods in the experimental group

Research findings indicate that teachers elicited a state of "engagement" in students in the experimental group, satisfying one of the three UDL principles, through use of an average of nine forms of teaching or presentation. These forms included, for example, self-education, modelling, representation of roles, playing, and peer education. These findings support Piaget's assertion that learner engagement is achieved through multiple modes of instruction, which motivates students (CAST, 2015; Spencer, 2011). Therefore, teachers should design learning environments in ways that engage students (Marino et al., 2014). The engagement has been deeply discussed in the UDL principles section (§ 2.1.3).

The data from this research appears to confirm the work of Courey et al. (2013), which found that "engagement" was achieved by motivating and attracting the student's attention by providing multiple avenues of participation, such as peer education and the use of social media. Various researchers have shown that one of the factors of successful inclusion is the use of multiple strategies for motivating students to learn (NCERI, 1994; Brady and Woolfson, 2008; Allison, 2012; Crabtree, Ashencaen and Williams, 2010). The findings in this study also support the claims of Rose and Howley (2007) and Huang (2007) that teachers should not depend on one teaching approach and instead should use a variety of teaching methods that take into account students' different needs.

5.2.1.2 Evaluation methods in the experimental group

Teachers used different means to evaluate students in both groups (SID and non-SEN). Seven methods were used in every lesson, including computers, interactive programmes, the

Internet, and social media. Finally, they used the usual methods of evaluation, such as games as exams and papers (UNESCO, 2005; Mitchell, 2005; Mittler, 2000; NCERI, 1994). Harlen (2007) confirmed that assessment of student progress is an important factor in education. In the experimental group, both formative and summative assessments were used.

Thus, our results show that the teaching in the experimental group achieved the third principle of the UDL framework, “action and expression”, which involves using alternative methods to allow students to express what they have learned. These findings support the work of Courey et al. (2013), who compared the study plans of teachers before and after UDL training. The results of that study showed teachers included various strategies based on UDL principles in their study plans, thus facilitating all students’ access to the content of the curriculum. The results of the present study show that UDL can help SID achieve a state of “action and expression”.

These findings support Piaget’s assertion that the “how” of learning is achieved through various methods designed to assess students' performance by training them to organize and express their ideas using multiple forms of “action and expression” (CAST, 2015; Rose and Meyer, 2002). In the current study, teachers used six to nine ways to stimulate expression and participation and assess their students’ understanding. Some examples of the forms of evaluation used in this study include UDL-designed software, cameras, camera holders, printers, written and oral questions, representation and role exchange, email correspondence with the teacher, social media such as Twitter and Instagram, and computers and search engines to research information on the internet. Therefore, various means of evaluation were encouraged so that students could express their ideas in multiple ways. SEN often lack access to non-SEN students’ school curricula because of assessment methods. The results of prior studies demonstrate that the use of technology may help enhance outcomes for students with disabilities (Anderson-Inman and Horney, 2007; IRIS, 2015). Thus, UDL allows students to improve their academic skills (Hehir, 2009) because action and expression allow learners to convey their understanding in the way that best fits their abilities (Meyer et al., 2014). The current study findings support prior studies’ claims that students taught through the UDL method demonstrate a greater ability to act and express than students taught through conventional assessment methods. Further details regarding these data will be discussed in the following sections.

5.2.2 Teaching methods in the control group

Teachers in the control groups utilized few learning methods, averaging two methods per lesson, typically including real tools and PowerPoint slideshows. This result supports the findings of Alhammad (2017), who showed that in mainstream schools it is difficult to find a unified strategy that contributes to the teaching of SID and non-SEN students in Saudi Arabia. That study also showed that teachers often combine a lecture with a discussion and demonstration in teaching non-SEN students (Alhammad, 2017). The findings of many studies confirm that teachers should not rely on one teaching method and should use a variety of teaching methods that take into account the different needs of students (Rose and Howley, 2007; Huang, 2007).

In conclusion, the results of the study after the interpretation support the three principles of UDL. Where helps students to the representation: through the use of multiple modes of presentation (such as sound, print books, animation, flashcards or pictures, 3D, and videos) to increase the rate at which students absorbed new information. Similarly, digital technologies are widely used to enhance student achievement and promote greater interaction. Also, the UDL supports students to engage with their peer, through use multiple modes of instruction. For example, self-education, modelling, representation of roles, playing, and peer education. Finally, the finding of this study supports the three principles of UDL by student's expression and action. Where students used UDL-designed software, cameras, camera holders, printers, written and oral questions, representation and role exchange, email correspondence with the teacher, social media such as Twitter and Instagram, and computers and search engines to research information on the internet. Therefore, various of the evaluation were encouraged so that students could express their ideas in multiple ways.

5.2.2.1 Teaching or presentation methods in the control group

Teachers used two methods to deliver information (discussion and dialogue) and relied on group explanation, occasionally employing the peer learning method. A popular explanation of why teachers used discussion and dialogue with students is that they thought students' thinking abilities and problem-solving skills were fostered in that way in addition to the opportunity to give feedback, ensuring that the students felt included in the planning of the course outcomes (Bates, 2014; Larson, 2000). However, we acknowledge that there are considerable discussions among researchers as to the criticisms of discussion and dialogue,

including being time-consuming as compared to other methods of teaching, such as lectures (Arreguín-Anderson, Torres and Ruiz-Escalante, 2011). Also, they lead the students to the interests of the participants to follow.

5.2.2.2 Evaluation methods in the control group

Teachers in the control group used one or two ways to collectively evaluate students, often including writing assignments and oral exams. This is consistent with Alhammad (2017), who showed that in Saudi Arabia, teachers used ongoing assessment in mainstream schools. They also tried to help all students, regardless of ability, to acquire knowledge and pass evaluations (Alhammad, 2017). Moreover, in Saudi Arabia, formative assessment is used to evaluate and provide feedback to all students (both SID and non-SEN) in mainstream schools on an ongoing basis (Ministry of Education, 2014). However, ongoing assessment based on prescribed knowledge that general education students are expected to master does not take into account the abilities of SID. Thus, they may be artificially restricting the ability of SID, which may reduce their participation in mainstream classrooms (Alhammad, 2017).

5.3 Experimental versus control group: Teaching methods, tools, and evaluation

Teachers in the experimental group used a number of learning tools, teaching methods, and means of evaluation to deliver information and evaluate the performance of the students, at a rate of seven to nine means or methods per lesson. In the control group, the teachers used limited means, with a rate of one to two to deliver information in per lesson.

The findings demonstrate that the teachers working with the experimental groups obtained higher levels in the means design terms of presentation, assessment, and student participation than those in the control group. We can conclude that the reason for these higher levels is that the teachers in the experimental group received sufficient training on how to apply UDL. This represents achievement of the three principles of UDL (representation, engagement and expression, and action). The results of LaRocco and Wilken (2013), Murray and Novak (2008), and Alkahtani (2013) support the current research. Those studies found that employing the UDL framework improves the special education system by guiding teachers in the use of alternative methods to evaluate and display curricular content,

which helped SID integrate into mainstream classes. The results also demonstrated the need to train teachers on how to use UDL.

LaRocco and Wilken (2013), Murray and Novak (2008), and Alkahtani (2013) focused on training mainstream school and special-education teachers in the UDL method using a quantitative approach. By contrast, the current study used a mixed methods approach to collect information about the effect of UDL on the teaching and integration of students and the obstacles to implementing UDL. Thus, further research using a variety of methods and tools (e.g. quantitative and qualitative methods, questionnaires, observational studies, interviews, open questions) could confirm the data reported in this study.

5.4 The post-test: Experimental group

A total of six students with SID passed the course with 86.5%. Student number one, who was more abled than the others in the group, had the highest score. The students' success can be attributed to the implementation of the UDL program, confirming the importance of applying multiple strategies of presenting and communicating information, as well as assessing student learning. In this way, these results support the arguments of Allison (2012), who suggested that successful inclusion results when teachers use a diversity of strategies to suit the needs of all students. Likewise, Rose and Howley (2007) have argued that no one teaching strategy is suitable for all students. Thus, teachers should develop educational strategies appropriate to the learning style of each student. For example, in this study, teachers designed multiple means of presentation and assessment according to each student's individual abilities, and in the way each student preferred to learn. By motivating students to participate, express ideas, and gain knowledge, this approach helped SID integrate with their non-SEN peers.

In the experimental group, the teachers used a number of means to teach both SID and non-SEN students. These included PowerPoint slides, flash cards, iPads, videos, audio devices, and software specifically designed for this study. Teachers used multiple methods, including peer teaching, discussion, self-learning, play, and multimedia. They also used multiple means of assessment (e.g. written, recorded, multiple-choice) so that they could evaluate students according to each student's abilities. This proved to be an effective means of embedding information in the memory of the students. It was observed and noted by the researcher of

this study that non-SEN students and SID preferred using the custom-designed software to study photography. This may be because it is interactive and can be used autonomously. Thus, we conclude from these results that the experimental group applied the principles of UDL (engagement, representation and action and expression). Also, the UDL principles are important for educating SID students with and Non-SEN students together.

This was the case with the non-SEN, six of whom scored 100%. This result supports the idea that the use of UDL provides flexibility in curriculum design and allows for the needs of all learners to be taken into account (Rapp, 2014). Moreover, UDL reduces barriers to instruction, thereby giving all learners the chance to access, take an interest in, and progress in the general education curriculum. These findings confirm that UDL provides a flexible methodology that can be modified and balanced according to individual needs by providing guidance for teachers in the development of instructional objectives, materials, routines, and evaluations that work for all individuals (CAST, 2011; Rose and Meyer, 2002; England, 2012).

Notably, however, repetition of information was observed to bore non-SEN students, even when means of delivering said information varied. This boredom likely reflects differences in the needs of SID and non-SEN students; teachers explained lessons in two sessions to address the needs of SID, who may need more than one session to master the skill correctly.

5.5 The post-test for the control group

The final results in the control group revealed that five of SID achieved passable scores (between 50% and 68%), and one student received a failing score of 45%. The main reasons why SID students scored poorly include the lack of variety in the ways in which information was delivered. The teachers in the control groups used PowerPoint slides and group discussions, which may have made thinking and remembering information challenging for SID. Moreover, the use of paper-based assessment methods often affected students' outcomes negatively by limiting the students' form of expression. For example, some students prefer to express themselves orally, whereas some students prefer to write or perform manual tasks. This finding is similar to that of Noble (2004), who argued that teachers faced challenges designing a curriculum that is suitable for all students. Thus, the inflexibility of the curriculum is a barrier that negatively effects the ability to implement inclusion strategies (Peters, 2004). Crabtree et al. (2010) have shown that curriculum design

is one of the key factors for successful inclusion. Mainstream schools provide general curricula that do not take into account differences in abilities among students (UNESCO, 2005). One additional reason that negatively affected students was their absence in one or both sessions. It was observed that those who missed the session(s) either lacked an awareness of the importance of the lesson or felt bored. Taken together, these results demonstrate that a lack of teaching methods used to teach SID and non-SEN together impacts learning and integration negatively.

The students' scores in this group also reflect the difficulty that teachers found in trying to communicate information to SID and non-SEN students at the same time. In other words, there is no uniform approach that fits both groups and that helps the teacher to explain and evaluate information simultaneously. As a result, the teachers were concerned with the delivery of information to SID, where the information provided was far less than what would be appropriate for non-SEN students. Similar findings were also reported by Alhammad (2017), who found that in Saudi Arabian mainstream schools it was difficult to design a unified strategy that improves the teaching of SID and non-SEN students. This is because teachers relied on using lectures accompanied by discussion and demonstration with non-SEN students (Bandura, 1977), whereas with SID they usually relied on individual teaching and peer training (Vygotsky, 1978).

A popular explanation is that the teachers depend on the Bandura and Vygotsky theories to teach non-SEN and SID students. Where, Bandura (1977) reiterates that teaching non-SEN students requires educators to provide lectures to ensure that they communicate the subject matter in an in-depth manner, which is crucial in making sure that the students acquire much interest in learning. Coupling lectures with discussions and demonstrations ensure that the strategy does not focus on teacher delivery but also emphasizes on student learning, thereby enabling a conducive learning environment (Committee on Undergraduate Science Education, 2000). However, Vygotsky (1978) grounds teaching via individual teaching and peer training for SID students as these learners are accustomed to individualised focus for attaining their effective education. When individualised learning takes place, the learners' independence can be taken care of with ease.

Lev Vygotsky's theory of social development (Smolka, Nogueira, Dainez and de Laplane, 2019) constitutes one of the pillars of constructivism. For instance, it asserts three principal themes related to interaction and establishes a zone for proximal development (ZPD)

(Smolka et al, 2019). ZPD represents the distance between the ability of the student in performing a task under the guidance of an adult or in cooperation with others. Similarly, it also entails the ability of the student to problem-solve on their own. Vygotsky believed that learning often occurs in this zone.

Also, Vygotsky's theory noted that the development of a student's academic and social skills requires full social interaction with adults or peers. Thus, Vygotsky's theory is appropriate for studying efforts to integrate SID and non-SEN students in the classroom, and underscores the fact that no single teaching strategy meets the needs of both SID and non-SEN students at the same time, which impedes inclusion. This confirms our previously mentioned point that teachers should not rely on one teaching method alone but should use a variety of teaching methods that take into account the different learning needs of students (Rose and Howley, 2007; Huang, 2007).

In addition, failures to use multiple means of presentation negatively impacts teachers' abilities to educate non-SEN students at a level commensurate with their abilities, because when these students become less enthusiastic about engaging in their lessons, they begin to feel bored, lose focus, and fail tests. For example, there are some students who possess strong mental and personal perseverance when searching for information, but some others who avoid lessons because they find them boring.

Indeed, the frequent absence of some students may have been due to the feeling among them that these lessons were not important or useful, or were boring. This finding emphasizes the need to design multiple approaches to motivate and engage students to learn and increase the effectiveness of their learning (Stanovich and Jordan, 2002).

Therefore, this study proposed the use of UDL, which offers multiple ways of teaching and evaluating students. This method helps to build methods that address learning preferences and differences (CAST, 2016).

5.6 Pre- and post-test results for each group

The findings describe the extent to which students in the post-test of the control and experimental groups improved. However, results indicate the development of performance favoured the experimental group, which used UDL to teach photography. There was a marked improvement in the performance of both SID and non-SEN students in the

experimental group. Four SID obtained a passing score in the post-test (66%), while two students got a “somewhat” passing score (34%). This result is not high compared to the pre-test, as three SID did not pass and three others got “somewhat” passing scores. In the non-SEN group, all students scored 100% in the post-test, while in the pre-test, three students received a “somewhat” passing score and three passed.

Most studies that have focused on the effects of UDL on the inclusion of both SID and non-SEN students have reached similar conclusions. The results show the potential effectiveness of UDL in teaching integrated classes (Vitelli, 2015; Lopes-Murphy, 2012; Evans et al., 2010; Murray and Novak, 2008; Spooner et al., 2007). It is clear that every person learns in their own unique way. UDL helps educators, students, and the community embrace such differences by providing different teaching techniques (Gargiulo and Metcalf, 2016).

In addition, the results revealed that SID and non-SEN students made significant progress and scored significantly higher in the post-test, which used a content acquisition UDL programme (Kennedy et al., 2014). Coyne et al. (2012) found that groups that used UDL programmes to learn reading skills scored significantly higher in comprehension tests.

Previous studies resembling the current study in terms of objective, study sample, and use of the experimental method (Spooner et al., 2007; Coyne et al., 2012; Kennedy et al., 2014; Lee et al., 2008) have revealed the impact of UDL on academic learning in SID and non-SEN students. However, these studies have not explored the effect of UDL on training such students in professional skills. Indeed, there is a lack of research that focuses on strategies to help train SID in careers where they can be independent. In addition, the prior studies were conducted in European countries and the US. Thus, in this study, SID and non-SEN students were trained in photography as a profession that might help SID become independent. This research, moreover, is the first to study the impact of UDL on inclusion of SID and non-SEN in Saudi Arabian schools.

However, results of the control group showed improvement of three SID who had obtained “somewhat” passing scores in the pre-test. Six students scored “somewhat” in the post-test having not passed the pre-test; students obtaining a “not passed” is normal because not all students have information on photography in the pre-test. In contrast, five non-SEN students improved significantly in the same group, with a score of 84%, and one student who scored 16% in the pre-test, “somewhat” passed the post-test.

Despite the benefits of UDL in developing the curriculum and improving the performance of non-SEN students that have been found in previous studies, Bryans et al. (2010) found that UDL intervention does not lead to improved grades. This suggests that there may be an optimal blend of tools and approaches, while the student perceptions may add value in the UDL-enhanced situation. In addition, a study by Marino et al. (2014) showed that students with learning disabilities did not demonstrate significant impacts of UDL-adjusted units compared to those using conventional curricular materials.

The differences between the results of the current study and the results of the Bryans Bongey et al. (2010) study may be attributable to the differences between the two studies' respective goals. The goal of the Bryans Bongey et al. study focused on understanding the impact of planning and implementation and the benefits of UDL. The sheer number of objectives of that study may have attenuated its results.

Study samples also differed between the two studies; the sample in Bryans Bongey et al. included all undergraduate biology students, which far exceeds the sample size of the current study, which comprised 24 students. From the perspective of the researcher of the current study, such a large number cannot be controlled and analysed in depth. Finally, Bryans Bongey et al. assessed their data using a webpage; with no human observer to assess the results, the webpage may have reported inaccurate data. Also, accessing some online communities can be extremely challenging (Wright, 2005).

Finally, the current study differs from Marino et al. (2014) in terms of sample characteristics. Where the sample in Marino et al. consisted of students with learning difficulties and non-SEN, the current study sample comprised SID and non-SEN.

5.7 The second research question: The experimental and control group

The second research question: Is the UDL an effective method for integrating the SID female students with non-special educational needs female students in the same classroom, from teachers' perspective?

From the teacher's perspective, the use of UDL has a significant effect on the inclusion of SID students with non-SEN students in the same classroom. It is clear from the questionnaire

responses that the vast majority (93%) believed that UDL fosters inclusion. This is consistent with findings from Kennedy et al. (2014), Spooner at al. (2007), and Lee et al. (2008).

In the current study, teachers stressed that UDL helps to foster inclusion for a number of reasons (see the answers in the teachers' appendix, 18). Specifically, they commented that UDL allows the teacher to exert less effort when teaching all students simultaneously. Moreover, they noted that this method is suitable for both groups of students because it relies upon student-specific presentation and assessment means based on individual student's abilities. Therefore, the principle of individual differences for learners with SEN compared with non-SEN people based on the instructional methods apply in their education systems. Special learning is more intensive when contrasted with conventional education. Students with SID require additional specialists. Their classes incorporate special teachers, physical therapists, and social workers, who provide exceptional knowledge beyond that of regular teachers who teach non-SEN. SEN learn from the Functional Curriculum, designed to meet the needs concerning daily living skills that they are unable to develop on their own. This curriculum incorporates communication of basic requirements, grooming, eating, and following directions. Conversely, the needs of non-SEN people are different because they do not require special care as a part of their education system (Montague, Warger and Morgan,2000).

Studies show that students with SID are flexible and successful in class (Geary, 1994). Despite their special needs, they put in substantial effort to persist against setbacks, and remain focused on their academic goals. Practice is another principle that entails empirical approaches that aid students to encode study concepts into their permanent memory. Creativity can be taught or nurtured to increase ideas for problem solving (Geary, 1994).

It is vital for each student to have an individual education plan, as it is one of the main principals in UDL and a requirement for teaching children with SEN in KSA. This is essential in order to document their capabilities and skills at the beginning of the programme (Billingsley and McLesky, 2004). Such a plan entails the curricula, goals, and special services that guide teachers to educate SEN students. An individual educational plan is a document that is developed for only high school students in need of special education in KSA. It is a detailed programme that reveals special educational requirements for a specific learner. The plan identifies services that will be offered to fulfil the needs for a special education child (Montague et al., 2000). To accomplish the needs set out in the principle of individual

differences for each student, teachers must apply teaching methods as well as multiple assessment methods (Billingsley and McLesky, 2004). Some examples include practical, individual, and group intelligence tests to offer ideal instructions that boost learning in special education classes.

In a similar vein, Lee et al. (2008) found that UDL helps students and teachers to access the general education curriculum. In addition, Lee et al. (2008) argued that future research should consider the role of UDL in enhancing access to the general education curriculum and as a means to foster inclusion. The hallmark feature of UDL is its ability to adapt educational methods to meet the needs of individual students, meaning that this tool is a training programme that can support teachers to achieve integrated SID and non-SEN classrooms (CAST, 2015). Courey et al. (2013) proved that efficient lesson planning using UDL empowers teachers to better meet students' individual needs and foster inclusion.

However, in the current study, opponents of UDL argued that it is useful only in simple lessons and photography, such as drawing and home economics, but not in more academic disciplines such as chemistry, physics, and mathematics. This finding contradicts findings like those of Coyne et al. (2012), who found UDL improved the reading skills of SID. Still, two studies are not enough to allow for generalization. In addition, the teaching of academic skills such as maths and science is difficult as compared to imparting SEN students with motor or professional expertise, because it requires high levels of mental processes. To address maths challenges among learners with SEN, teachers need to respond to interventions. It is essential to use benchmark assessments to identify the students who pose difficulties in learning such subjects and offer them tiered intervention programmes (Geary, 1994). Such programmes incorporate recent intervention plans such as Conceptual Model-Based Instruction or Cognitive and Metacognitive Instruction, which are known to improve academic skills performance in mathematics among SEN students.

It is difficult for SEN students to comprehend science articles. Studies have shown that this subject is difficult for SEN students because the science curriculum is entrenched with advanced studies that involve organizational and thinking skills that serve as predictors of future academic success (Montague et al., 2000). The related demands for time management and planning are overwhelming for students with SEN, which makes it difficult for them to understand such science articles. For instance, learners must be competent regarding

effective ways to study and design their courses before they can master the content. Learning must be facilitated through clear instruction, assessment, and organization (Montague et al., 2000).

Teaching professional or motor skills (actions that are combined to create physical activities) to SEN students tends to be simpler, because it does not incorporate high levels of thinking. Clearly, these are life skills that will equip the learners to make proper decisions and handle problems in their professional and academic careers (Billingsley and McLesky, 2004). Students need to learn these skills at a tender age; they can be developed using instruction to accomplish the desired outcome.

Marino et al. (2014) argued that students with learning disabilities did not perform any differently in those units relying upon UDL and those that relied upon conventional teaching methods. Their study showed no significant differences between those with learning disabilities and those without in the post-test results. The authors concluded that inclusion was not achieved, and that complexity was amplified with UDL, such as through the need for more computers, more papers, and more accommodations for those with special needs.

In conclusion, consistent with most prior studies, such as Kennedy et al. (2014), Spooner at al. (2007), and Lee et al. (2008), which showed that UDL helped students with special needs integrate with their peers in school, our results showed that UDL helps foster inclusion for SID and non-SEN students in the classroom, by meeting the individual learning needs of each student.

5.8 The third research question: The experimental and control group

The Third Research Question: What are the advantages, drawbacks, and barriers associated with the implementation of the UDL method in the classroom from an observer's and teacher's perspective?

5.8.1 The advantages of using UDL from the viewpoint of the principles

5.8.1.1 Principle of engagement

UDL has an important role in motivating students to learn by providing information that helps them to engage with teaching content. Consequently, engagement constitutes the first principle of UDL and offers opportunities for participation among students. In the current

study, through the questionnaire, teachers in the experimental group indicated that the greatest benefit of UDL consisted in the way it allowed teachers to design class activities that matched student interests and to provide options for accomplishing course activities in class. However, the teachers noted that the least beneficial aspect of UDL was that it did not encourage students to study as groups outside of class. The answers of the participants in the open-ended questions supported these findings, and for a deeper discussion see § 5.9.1 and5.9.2.

In the control group, teachers mainly encouraged students to work in small groups during class. Their least preferred method of teaching was via lecture, especially without the ability to offer online assignments. The results of Alsalem's (2015) study showed that technology is not available to students in Saudi Arabian schools to help them engage in general content. This is due to a lack of Arabic-language Programmes and software. UDL aids teachers to simplify concepts to help students improve organizational and study skills (England, 2012).

Engagement includes motivating students and stimulating their interest in learning through meaningful instruction, hands-on activities, and creativity, in order to tap into their interests and sustain adequate levels of engagement (Courey et al., 2013). A good learning tool should have multiple means of engagement to tap into learners' interests and motivate them to learn (Spencer, 2011). Therefore, teachers, as designers of the learning environment, need to be concerned with how students are engaging with the learning process. This starts by simply being concerned with the accessibility and usability of the teaching materials, so that a wider understanding of engagement can be supported, including whether students are actively engaged, working collaboratively in a group, or working separately on their own (Marino et al., 2014). Engagement within the context of UDL provides options for self-regulation through promoting beliefs and expectations that optimize motivation to learn and develop reflection and self-assessment.

The topic of self-regulation has received a lot of attention in the educational discourses of Western countries such as the UK. Self-regulated learning is an active, constructive process in which learners set goals to help them monitor and regulate their cognition, motivation, and behaviour. Self-regulation is of significance to SID and non-SEN students alike because it facilitates better learning and assessment. Additionally, it is strongly linked to the UDL principles of flexible learning, flexible study resources, and flexibility in testing in the way in which it empowers learners (Pintrich, 2000). Therefore, the teacher must design tools, such

as interactive software, and provide means, such as use of computers and the Internet, to achieve self-regulation.

In addition, teaching guided by the goal of self-regulation optimizes learners' options and autonomy and minimizes distractions and threats (CAST, 2015). In self-determination theory, the first dimension of supportive teaching is autonomy support, as opposed to autonomy suppression. Autonomy-supportive practices provide students with a choice, whereas autonomy-suppressive practices are controlling (Belmont, Skinner, Wellborn, Connell and Pierson, 1992) or intruding (Assor and Kaplan, 2001; Leptokaridou, Vlachopoulos and Papaioannou, 2016). The researcher noted through the observation lists that non-SEN students are self-reliant in learning or do self-learning, similarly are students with SID but they need some help from their peers or teachers. In the current study, the student preferred to learn by the self-learning way because perhaps the educational software is designed in an interactive way that attracts students to the content and gives them clear instructions to move easily in the program. UDL also leaves space for students to choose their own activities and assessment methods, as presented in the methodology chapter (§ 3.63.7).

This dimension is associated with the inherent desire of individuals to experience volition, to be causal agents. Providing choice includes enabling students to choose tasks they perceive as at least somewhat interesting or important (Assor and Kaplan, 2001; Belmont et al., 1992), and nurturing inner resources, for example by finding ways to incorporate students' interests and preferences (Reeve, Jang, Carrell, Jeon and Barch, 2004).

UDL aims to provide choices to sustain effort and persistence that fosters collaboration and increases mastery-oriented feedback. Provision of feedback is an integral aspect of learning in most settings. Feedback provides critical information to the students about their performance. Without the scrutiny that feedback brings to the learning process, the learning process can be impaired. Feedback is central to UDL in that it allows learners to gain further insight and guidance for their learning process, providing them with the opportunity to adjust their self-monitoring and reflective habits (Haimovitz and Dweck, 2017). In Saudi Arabia, the feedback provided is not always relevant to the students' expectations (Almasoud, 2017). Therefore, there is a need to incorporate various technologies in the provision of this feedback.

5.8.1.2 Principle of representation

Regarding multiple means of representation, teachers predominantly presented information in a variety of ways (verbally, visually, aurally, and tactilely). However, the teachers least often encouraged students to use online resources and websites to learn class information. In the control group, teachers most often presented information in a variety of ways (verbally, visually, aurally, and tactilely) and least often used digital or electronic, multimedia texts.

Previous research, such as CAST (2015), argues that representation gives learners multiple means of acquiring new facts and knowledge in acceptable and flexible ways. It allows students to choose the most appropriate approach through which to acquire information, the one that best suits them and reflects an individual's abilities and disabilities. This means that the learner has a wide array of alternatives when accessing information, meaning that they will find it easier to understand the content (Center for Training Enhancements, 2015). As a form of representation, Moody et al. (2010) noted that electronic materials and smart technology were universally used by students to enhance achievement and to allow for greater interaction with the materials. UDL relies on technology to offer various means through which students can learn, interact, and engage with learning materials (Dalton et al., 2012). However, Alsalem (2015a) argued that in Saudi Arabia, few teachers use the Internet, multimedia programmes, or smart technology with students. Alsalem's study is the first to examine the challenges facing UDL application through the opinion of teachers of deaf students in Saudi Arabia. Therefore, it is not possible to expand the discussion of obstacles or to generalize its results. In addition, the Alsalem study did not examine the logistical constraints of UDL application even after being given practical experience using UDL with students.

5.8.1.3 Principle of action and expression

Regarding action and expression, teachers in the experimental group reported that they provided students with outlines of the steps required to complete assignments, along with clear guidelines for how to successfully complete all major courses. The least frequent response was that they provided multiple types of assignments featuring various types of modern media (e.g. written articles, podcasts, presentations, videos).

For the control group, the most prevalent answer was the teachers provided activities for students to demonstrate their knowledge in multiple ways. However, the least prevalent answer was that teachers provided models or examples of class projects and assignments, allowing students to choose how they complete their assignments.

These results agree with the findings of Courey et al. (2013), who argued that action and expression reflect students' understanding through the avoidance of traditional assessment methods. Thus, these principles emphasize supporting students by providing alternative means for demonstrating what they know. Moreover, Anderson-Inman and Horney (2007) argued that digital technologies influence outcomes for SEN students by helping them show how much they understand. It is necessary to employ multiple means by which to assess student understanding because SEN students often lack the transitional skills required to access the general education curriculum and achieve success in school (Anderson-Inman and Horney, 2007). Action and expression help learners to express their understanding in the way that best fits with their abilities (Meyer et al., 2014). Thus, UDL helps students express themselves more creatively and think more critically (Hehir, 2009). In this study, it was observed that students in the experimental group expressed their understanding of information more creatively compared to the control group. For example, students in the experimental group used social media, such as Instagram, Emile, Twitter, and so on, to communicate about their integration experiences as SID and non-SEN students. The control group, meanwhile, used traditional writing and discussion to express themselves and engage with one another.

The negative results in this study agree with those in Alsalem (2015), who found that teachers did not use multiple types of assignments or various types of media (e.g. written materials, podcasts, presentations, videos) due to a lack of information among teachers about the effective use of technology. Indeed, this lack of information may be due to a lack of interest or resistance to change. In fact, there seems to be an emerging resistance of teachers to the need to develop an integrated education system. As a psychological reaction, resistance is a product of stereotypes within the organization, such as with Saudi Arabian teachers who are unwilling to change their attitudes toward new learning processes (Alhammad, 2017). As part of the Saudi Arabia Vision 2030 initiative, the Saudi government plans to prepare a modern curriculum grounded in rigorous standards of education and character development. This is inconsistent with the resistance theory that acts against any form of change in Saudi Arabia.

As a recommendation, teachers should not resist change in class integration, as it goes against the norms and expectations of Saudi society (Alshuwaikhat, Adenle and Saghir, 2016).

5.8.2 General barriers to implementation of UDL

There are many barriers to implementing UDL in Saudi Arabian mainstream high schools. The barrier most frequently cited by teachers in both the experimental and control groups was limited access to the Internet at school. In contrast, a small number of teachers in the experimental group cited a lack of understanding of how to use technology in their classroom and viewing the use of technology in class as a disruption as barriers. The least cited barrier in the control group was the view of the use of technology in class as a disruption.

From the responses, it is clear that some teachers have a problem using technology, such as the Internet, smart devices, multimedia, and computers in the classroom due to insufficient information on how to use technology in the classroom and a lack of the necessary equipment. This conclusion is consistent with Alsalem (2015), who recognized that knowledge about using technology amongst teachers in Saudi Arabia is limited because they do not receive adequate training. Also, most teachers remarked that their schools are not equipped with the Internet, computers, or any digital technology.

These findings are consistent with research that showed that there were decreases in the resources that can impact teachers' practices when implementing inclusion interventions in Saudi Arabian mainstream schools. In addition, Alotaibi (2011), Rajeh (2013), and Alibrahim (2003) showed that the majority of teachers in Saudi schools lacked sufficient materials, sports equipment, and teaching aids. This means that they would fail to meet the needs of those students with special educational needs in mainstream classrooms (Minke et al., 1996; Fakolade et al., 2017). Alshahrani (2014) indicated that the availability of high-quality resources would help to foster greater inclusion.

5.8.2.1 Barriers: understanding of UDL

It is clear that the average of (MD) the teachers in the experimental group were higher than those in the control group. In the experimental group, the score was an average of .4, as opposed to .2 in the control group. This suggests that the control group faced an obstacle to understanding the UDL method and that practical training increases practitioner understanding of implementing UDL.

Therefore, we can point towards a number of key findings concerning barriers to understanding UDL in Saudi Arabian mainstream high schools. For the barriers from the teachers' opinion in the experimental group, the most frequent responses were that the effective networks are strategic networks and a learning context. In contrast, the least frequent barriers cited were the recognition network of the brain and that the use of technology in class is a disruption.

For the control group, the highest responses of teachers pertained to the critical elements of UDL. Also, the highest results for teachers were that they could learn how to plan a lesson using UDL. They also understand the importance of the theoretical framework of UDL. On the other hand, the lowest score is that teachers do not have knowledge of recognition networks and of the recognition network of the brain for UDL. They also do not know how UDL works better and what the effects are of UDL on the teaching process. Previous results reveal common barriers between teachers in both groups. This shows that teachers have a problem comprehending UDL, that they do not know how to define UDL, and they do not understand how UDL interacts with brain networks. Also, they have trouble understanding the steps involved when using this method or its strategy in teaching. Therefore, a lack of understanding of UDL and a lack of available technological resources are two of the most important impediments to UDL's application in Saudi Arabia.

This result is similar to that reached in a number of other studies, most notably that of Alsalem (2015a), who found that in Saudi Arabia, a lack of understanding by teachers of UDL is one of the most common barriers to its successful implementation. Teachers require sustained training and practice to apply UDL successfully. This can be achieved in intensive training workshops. According to Shah (2012), although many teachers say they understand the importance of UDL, in reality they are unsure of how it works. Also, greater assistance and knowledge is required concerning how to turn ideas into practice. The studies by Alsalem (2015b) and Shah (2012) found that one of the frequently discussed challenges is a lack of practitioner understanding. Teachers often wondered where to begin, how to start, and how to decide if what they were doing conformed to the principles of UDL.

5.8.2.2 Barriers: teacher acceptance after applying UDL

In the experimental group, the most common barriers cited reflected teachers' desire to modify their use of UDL based on the experiences of their students. The most infrequent

barrier cited was teachers' lack of interest in UDL. In the control group, the most commonly cited barriers were that the teachers were concerned about students' attitudes toward UDL, that they would like to develop working relationships with other teachers using UDL, that they would like to discuss the possibility of using UDL, that they would like to know what resources would be available if they decided to adopt UDL, that they would like to have more information on the time and energy requirements of using UDL, and that they would like to know how their role would change as teachers when using UDL. The least cited barrier was a lack of interest in learning about UDL.

The mean score for teachers in the experimental group was higher than that for the control group. The experimental group obtained an average of 3.2, but in the control group it was 2.9, indicating that the experimental group accepted the UDL method more than the control group. Moreover, teachers in the control group somewhat accepted UDL, and this was one of the obstacles facing the implementation of UDL in schools. This is due to a lack of practical training for teachers, meaning that they did not understand UDL. This is consistent with the findings of Shah (2012), who showed that there were differences in teachers' abilities to understand UDL. The application of UDL required greater support and guidance about how to put ideas into practice, thus creating less obstacles to adoption. Previous studies have shown the need to train teachers on how to use UDL. For example, LaRocco and Wilken (2013) and Murray and Novak (2008) focused on training in mainstream schools and showed that special education teachers using the UDL method found that it improves the outcomes of special education. According to Alkahtani (2013), training in UDL helps to develop the teacher's skill and knowledge overall.

Experimental and control group*:* In the experimental group, the rates for the second and third variables in terms of engagement were .5 and .8, respectively. Moreover, there was a relationship between the control group and the sixth variable on the same axis, with a rate of .7. However, there was no relationship between the other variables.

5.9 Discussion of results for open questions: Qualitative results

The results show the participants' responses for each question. There were eleven open-ended questions in the questionnaire, and the total response rate for the 1st, 4th, 5th, 6th, 7^{th,} and 8th open-ended questions was 100%; for the 2nd and 3rd questions it was 93.8%, for the 9th question it was 75%, and for the 10th question it was 56.3%. Questions 9 and 10 received

lower response rates perhaps because the teachers felt tired from answering the lengthy questionnaire. Or perhaps it was because teachers did not have ideas about future plans for using UDL. Also, the evidence shows that question number eleven was answered because it is easy to answer.

5.9.1 Question 1: Advantages of using UDL

We can see a number of key findings in terms of perceived advantages of using UDL. The majority of the respondents felt that the most important advantage of using it was its creation of an interactive environment that allows for the use of new and varied teaching methods (56.2% of respondents mentioned this). On the other hand, 31.2% said it was useful as a means of inclusion of students within general education, and 25% thought it was useful as a way to supplement old technology and teaching approaches with new ones. These results fit well with previous studies. For example, Rose and Meyer (2002) showed that UDL is a flexible curriculum and includes a wide range of instructional practices, learning activities, and materials. In addition, UDL has helped students to understand information using many formats, whether visual, textual, aural, or tactile (Rose and Meyer, 2002). This provides learners with an opportunity to access the material in the way that best suits their learning strengths. Therefore, learners are able to acquire the information and knowledge in ways that allow them to engage with the topic. Additionally, UDL allows for different ways of interacting with the material and lets students demonstrate what they have actually learned. Teachers are able to support students using various means, such as oral presentations, pencil-and-paper tests, or group projects. According to Ashman and Elkins (2002), this reinforces student understanding, thus making them expert learners.

Karger (2005) found that UDL helps to create an interactive environment, offering appropriate challenges and increasing student motivation. Student engagement in learning is important due to different observations. First, the students are in a better position to become active learners and increase their level of motivation as they learn. Second, students feel in control of their learning process, which enhances their output. Student engagement in learning is therefore a critical component of education (Almasoud, 2017). UDL helps students to become more motivated, by making skill-building seem like a game, and by creating opportunities for learners to get up and move freely around the classroom. Fun and autonomy play an essential role in learning. Fun is important because bored students are least likely to concentrate on their learning while those having fun in the learning

environment are most likely to concentrate. Autonomy gives the students the feeling of being in control, hence more engagement with their learning (Alhammad, 2017). Educators can sustain student interest by letting them make choices and by giving them assignments that are relevant to their own lives, and is congruent with the principles with self-determination theory. UDL reduces barriers to subject engagement by providing students the chance to access, take an interest in, and progress in their learning (Rose and Meyer, 2002).

5.9.2 Question 2: Disadvantages of UDL

This research unveiled some important findings on the disadvantages of using UDL. UDL requires teachers to use many technologies and smart devices. This disadvantage has resulted in the following obstacles. It is clear that 31.2% of the teachers felt that the smart technology and facilities required are not available in mainstream schools. This may include iPads, e-books, and Arabic software. Alsalem (2015a) has demonstrated that there is a lack of technology available to Saudi Arabian mainstream schools to help engage students. It seems that the school itself might be the culprit. Some managers and teachers have no experience using or ability to operate these devices. Therefore, they are disinclined to go to the trouble of ordering them from the education ministry (Alsalem, 2015a; Alhammad, 2017). Additionally, there is a lack of software written in Arabic. As UDL tools mainly consist of smart devices and instructional software (Alsalem b, 2015), future research should focus on how to effectively train teachers in using smart technology in a sophisticated way.

We can also see that 31.2% felt that UDL increased their workloads. A popular explanation for the increasing burden on the teacher is that UDL requires the use of technology, multiple means of communicating information, and a variety of ways of assessing students' understanding. Thus, it was noted that the teacher needs to spend considerable time and effort to adequately meet the needs of all students. However, as Karger (2005) argues, UDL is often designed from the start to address the needs of the greatest number of its users. Some interpret this to mean that it is costly, excessively tedious, or time-consuming, and requires unnecessary changes to existing modules (Karger, 2005). This attitude engenders a reluctance among teachers to learn the new technology. The large number of students in classes can also be a barrier for teachers in learning how to use the technology. Teachers need time to learn. Saudi Arabia consists of three levels of education: elementary, intermediate, and secondary. Each level of education carries different class sizes. For the disabled students, the average class size is unclear and is estimated at ten students per class

on average. After integration, the average number of students in the class were 26 for boys and 28 for girls, as classes are separated by gender (UNESCO, 2018). In the UK, the average class size stands at 20.8, which is relatively low compared to that of Saudi Arabia. The Saudi Arabian classes have therefore become bigger compared to those in the Western world, as schools have become more integrated (OECD, 2018).

Results also showed that UDL required great effort and help for all teachers so that they could correctly apply it. However, the findings indicated that 31.2% of teachers shared the view that there is no interaction between teachers of special education and students' school teachers when implementing the UDL programme. These results are similar to those found by Alanazi (2012), who showed that in Saudi Arabia, there was no official and ongoing collaboration between teachers that allowed them to support one another. The absence of collaboration between teachers goes against what is needed for inclusion and means that SID students and non-SEN students in mainstream classrooms receive segregated education. This is in spite of the fact that collaboration between staff in schools is an important prerequisite for inclusion in Saudi Arabia and other countries (Alanazi, 2012). There is thus a need for professional collaboration; teachers need to work together to identify, diagnose, and solve the problems encountered by students with special needs (Afeafe, 2013).

Lastly, we can see that much time and effort needs be exerted to collect and prepare the material to be delivered to students. A total of 31.2% of the teachers were reticent about the added work load involved in learning and implementing UDL. This finding supports the conclusion of Hall et al. (2012), which showed that the implementation and maintenance of UDL requires a substantial amount of funds and other resources.

5.9.3 Question 3: Teacher opinions about cost, time, and effort level in planning and designing for UDL

We can see that the majority of teachers (81.2%) felt that the UDL required large amounts of time and money. A total of 50% felt that it took too much time to be implemented and applied. Because of the cost involved, teachers suggested that UDL should be adopted by the ministry and provide it to schools that were reluctant to spend their own money.

Other studies have also determined that UDL requires considerably more time and effort than other teaching methods. It is also expensive, cumbersome, and requires many other resources, such as technological equipment (Shah, ٢٠١٢; Hall et al., 2012; Karger, 2005).

5.9.4 Question 4: Financial and logistical obstacles to implementing UDL

Half of the teachers confirmed that the cost was too high, and so was a major obstacle to UDL application, with 43.8% saying that there were no smart devices in the school that could be used to help implement and apply the programme, and 62.5% felt that classes were not well prepared for UDL, in terms of resources, technology, and staff numbers. It was also felt that there were not enough computers available for students. Because both SID and non-SEN students were bought together in the computer room, it was felt that there was an increase in the usual number of students. Moreover, 37% felt that there was no-one available to maintain the computers.

Alsalem's (2015) study mirrors these findings. His results showed that the most frequent barrier was limited access to the Internet in schools and a lack of smart devices and knowledge of how to use technology. This is also consistent with research that showed a decrease in available resources, which influenced teacher practices, in mainstream Saudi Arabian schools (Alsalem, 2015a). This is supported by Alotaibi (2011), Rajeh (2013), and Alibrahim (2003), who showed that the majority of teachers in schools lack materials, sports equipment, and teaching aids. A lack of these kinds of resources would poorly accommodate students with special needs in mainstream classrooms (Minke et al., 1996; Fakolade et al., 2017). Furthermore, Alshahrani (2014) showed that the availability of high-quality resources would help to implement inclusion effectively.

Other research also mirrors the findings in this study that point towards a lack of specialized staff serving the needs of special education students (Alshahrani, 2014; Alothman, 2014; Alsalem, 2015 a; Alhammad, 2017). It is apparent that for the successful inclusion of students, there must be an adequate number of knowledgeable, prepared staff. Staff need the skills to enable them to provide sufficient and appropriate services for children with disabilities in regular schools. The teachers require in-service and pre-service for development opportunities. In Saudi Arabia, teachers are expected to undertake professional opportunities for development and to improve the implementation of inclusion measures (Alhammad, 2017).

Student Behaviour

Teachers' opinions about student problems. From the results, 43.8% of teachers see that there are no problems at all between SID and non-SEN students, such as non-interaction or

refusal to cooperate. This may be because non-SEN students sympathize with SID. In fact, the researcher's observations showed that the success of the study was attributable to sympathy on the part of non-SEN students for SID. Non-SEN students were very affectionate with SID. Hadidi and Al Khateeb (2015) supported this idea and proved that there has been increased sympathy for students with special education needs in Saudi Arabia because the non-SEN students see students with special education needs as unable to compete equally with them. Other reasons for sympathizing with those students derive from their lack of protection, their greater need for attention, and their victimization by physical and psychological abuse (Hadidi and Al Khateeb, 2015). Non-SEN students have developed an interest in helping and including SID out of love, sympathy, kindness, and the need to see them smile.

Contrary to this finding, some research has revealed problems in the relationship between special needs students and their non-SEN peers. For example, Nepi et al. (2015) and Mullick et al. (2012) have discovered that students with special needs suffer rejection from their peers in schools. Moreover, Nowicki (2003) concluded that non-SEN students may not accept SID students and may prefer their non-SEN peers. The reason for the refusal is that non-SEN students see the students with special needs as being unskilled and thus feel bored when playing with them (Bebetsos et al., 2013). In addition, the absence of joint activities between students with special needs and non-SEN students reduces the involvement and interaction of students with one another (Rajeh, 2013). However, these studies are rather dated. Indeed, technology has fostered tolerance and ensured the dissemination of information to a level where the educators in Saudi Arabia are conversant with means by which other nations offer education to disabled persons, as well as with ways to lobby the government to provide more human and financial needs for learners with disabilities (ALShamare, 2019).

The findings indicated that 18.7% of respondents felt that there was no cooperation between SID and non-SEN students. This is mirrored in existing work, which has shown that in Saudi Arabia, mainstream schools lack the kinds of activities that encourage SID to interact with their peers, leading to a lack of cooperation. The findings of Alhusayn (2004), which confirmed that students with difficulty learning suffer social problems interacting with non-SEN students in mainstream schools, supports our findings.

School staff cooperation

Teachers' opinions about the problems faced by school teachers and staff. Half of the teachers reported seeing no problems at all with the staff. Recent research suggests that

there are problems between staff who work with SID and non-SEN students in mainstream schools (Alhammad, 2017). UNESCO (2005) confirms that a lack of trained and qualified staff is one of the problems affecting the inclusion of people with special needs all over the world. Moreover, multiple studies have shown that inadequate training of school principals and special education teachers negatively affects the extent to which inclusion is prevalent in mainstream schools (Greenberg et al.,2016; Reid, 2005; Winter, 2006). The other half of the teachers claimed that there was no cooperation between teachers of general education and school personnel. This result is consistent with Afeafe (2013), who found that in Saudi Arabia and other countries, professional collaboration is needed between staff and those teaching students with special needs. The primary purpose of the partnership is always to increase the effectiveness and quality of educational programmes for those with disabilities within the general education platform. In addition, Alanazi (2012) showed that in Saudi Arabia, there was no official and continuous collaboration between teachers. The absence of collaboration between teachers goes against what is required for inclusion and leads to separate education being provided to SID and non-SEN students.

Out of the teachers surveyed, 6.2% reported sensing resistance from leadership and staff. In some schools, this leads to a refusal to fully include SID with non-SEN students. Some school administrators do not want to change the system and use new ideas. For example, some of the leadership in schools refused to participate in the current study, fearing exposing their school to a new strategy. Indeed, this was one of the main reasons for the relatively small sample used in the current study. These findings are consistent with research that shows that there are administrative problems in mainstream schools in Saudi Arabia (UNESCO, 2011; Alhammad, 2017). There are different administrative problems that Saudi mainstream schools face, some of the most important of which include work-system-related problems. That is, some schools have problems organizing the students' activities based on what the students ought to work on, the amount of work that is required of the students, and how the work can be evaluated in such environments (Almasoud, 2017). The administration, therefore, has to come up with the best practices that are sensitive to the diverse needs of the students.

In addition, Hassanein (2015) showed that one of the challenges to inclusion is a lack of effective leadership in mainstream schools. Similarly, Mullick et al. (2012) showed that authoritarian leadership inhibits the ability of teachers to foster inclusion. It was noted by

the researcher in the present study that leadership is an obstacle in the development of integrated schools. For instance, there was a clear lack of interest among administrators in consolidating classes. In each school, there was a room equipped with computers and a projector for people with special needs, but they do not work because administrators do not ensure that these devices are properly maintained. Hadidi and Al Khateeb (2015) explained that school principals, as well as school staff, have become an obstacle to the integration of students with special education needs in Saudi Arabia because they consider it a burden.

5.9.5 Question 5: Teachers views on UDL

"Can UDL be used as a basic programme for training students in the field of vocational habilitation? Or do you consider it an auxiliary one? Why?" The results of this question show that 87.5% of teachers felt that UDL can be used as a basic programme. A basic programme is a programme that can be used to teach students on a daily basis. Teachers believed that UDL is important as a means to design lessons that are accessible to all students, which agrees with the findings of Spooner et al. (2007). Similarly, Meyer et al. (2014) confirmed that UDL helps teachers come up with creative ways to teach students and to help each learner individually. Moreover, UDL helps teachers to identify the learning methods required by each student, thereby giving opportunities to students that have similar learning needs and increasing the range of possibilities and support that are available (Ralabate, 2011). UDL allowed teachers to incorporate many different learning styles in order to stimulate student interest. Hence, the lesson can involve each student (CAST, 2011). In addition, it helps teachers to meet the challenge associated with serving all students, including those with special needs, while also improving learning for all (CAST, 2011). Finally, LaRocco and Wilken (2013) and Murray and Novak (2008) found that UDL improves special needs education. UDL is at the centre of improving the quality of special needs education. One core principle of UDL is the increasing of the autonomy of the students during the learning process, adjusting evaluation methods to match the required learning outcome, and creating an environment that considers the needs of the students with special needs. UDL has therefore improved the quality of learning for SID students through the creation of a learner-friendly environment (Marino et al., 2014). According to Alkahtani (2013), UDL helps to increase the skills and knowledge of teachers.

Although, the results of this study are largely in favour of UDL, the findings of Webb and Hoover (2015) indicated that teaching with UDL was seen to be quite stressful for teachers because UDL requires considerable time, whether designing classes or evaluating students.

5.9.6 Question 6: Training intensity

The results show that 100% of respondents thought that the UDL method required training and practice. This result is consistent with those in Shah (2012), who found that teachers experience difficulties understanding UDL. There are obstacles to the application of UDL, because support and information is needed to translate theoretical ideas into practice.

5.9.7 Question 7: Conventional versus UDL teaching methods

Teachers' opinions about the difference between conventional and UDL teaching strategies were mixed, with 68.7% aware that UDL relies on three approaches to delivering information, rather than the one or two used in usual teaching approaches. This is consistent with what has been found in previous research in Saudi Arabian mainstream schools, where it has been difficult to find a unified strategy that contributes to the teaching of SID and non-SEN students (Alhammad, 2017), because teachers use a lecture with a discussion and demonstration with non-SEN students (Bandura, 1977). With SID, however, teachers usually relied on individual teaching and peer training (Vygotsky, 1978). Therefore, a lack of appropriate strategies for teaching SID and non-SEN students simultaneously impedes inclusion. Accordingly, researchers stress that teachers should not rely on one teaching method and should use a variety of teaching methods that take into account the different needs of students (Rose and Howley, 2007; Huang, 2007). A total of 68.7% found that normal teaching strategies were boring, whilst 43.8% thought that UDL was valued by students. This echoes Crabtree, Ashencaen and Williams (2010), who found that traditional teaching methods should be replaced with an effective curriculum that will attract students and encourage educational inclusion.

A quarter of participants considered teachers as the main teaching element in normal teaching strategies. In UDL, though, the teacher is secondary and relies upon various teaching techniques and multiple means. We see this in Saudi Arabian schools, where the special education teacher is responsible for designing vocational skills training and choosing appropriate educational strategies based on the capabilities of SID. Students are taught simple professional skills such as photography, sewing, buying, and selling, and are trained

to interact with non-SEN to develop their abilities to cope with different life situations (Alfleaj, 2001). In addition, by observing the UDL application, the researcher discovered that the teacher is primarily responsible for designing the students' teaching aids. Often the teacher relied on the usual means, such as paper, pen, blackboard, and some paintings and illustrations. The reason the teacher uses the conventional means is to decrease the financial cost, effort, and time burden on teachers.

Finally, the results show that 31.2% of respondents felt that UDL aids inclusion, 6.2% felt that it is suitable for all levels and individual differences, and 25% reported that the students can choose the material they study, and the means of learning and assessment. Moreover, the teachers said that UDL is more organized, comprehensive, and makes it easy for the teacher to deliver information compared to the usual teaching strategies. This is confirmed by Rapp (2014), who showed that UDL provides the flexibility for the curriculum to take into account all students. Similarly, Rose and Howley (2007) proposed that there is no one teaching strategy that is suitable for all students, and thus that teachers should provide a teaching strategy that meets the learning style of each individual student through a flexible, student-centred approach. Thus, teachers can use a specific strategy for a specific student, to meet their needs. Whereas, Huang (2007) found that instruction strategies that do not take into account differences in the abilities of those with and without special education needs is a barrier to inclusion.

5.9.8 Question 8: Future use of UDL

The findings show that 87.5% of teachers said that they would like to use UDL in the future because of its effect on students. However, 12.5% of teachers said they did not wish to use UDL in the future because they believed that there was lack of strategies to include SID and non-SEN students in the same class. In the end, the results showed that there were teachers neutral to using UDL in the future. Also, they believed that they would use UDL after they receive adequate training, because it is hard to understand the meaning of UDL from only one or two instances of using it in the classroom. This result was discussed previously in more detail when answering open-ended question number six.

5.9.9 Question 9: Improving the use of UDL

Of the total number of teachers, 31.3% felt that regular, frequent training would improve their abilities to implement UDL in the future. The same number (31.3%) of teachers felt that

the Saudi education ministry should cooperate with teachers in terms of providing adequate means and budgets. Moreover, 31.3% felt that teachers should cooperate with leaders and other organizing authorities, 25% felt that the ministry should pay to design the UDL programme and to support teachers, and 18.8% felt that teachers should be helped to prepare for the use of UDL and associated technology through workshops to educate them in the use of smart technology. Finally, 6.2% felt that preparing teachers and the classroom with computers and smart technology would be beneficial.

Alsalem (2015a) recommended that workshops should be held that develop the professional skills of teachers. He also suggested that there should be an increase in the number of conferences and training courses provided. He also recommended that technical support should be provided to teachers and students so that they can better use technology. Lastly, he recommended that schools should receive extra funding to install UDL and train teachers. UDL has not only impacted the learners but has also inspired the development of skills and knowledge in regards to the teachers. UDL is an instructional framework that, unlike other past frameworks, provides a guideline for interacting with, understanding, and teaching students with diverse needs and from different socioeconomic backgrounds. As such, it has allowed for more understanding of the teaching fraternity; this can effectively respond to the needs of the students. UDL has thus improved the skills and knowledge of teachers (Marino et al., 2014).

5.9.10 Question 10: Additional comments

Half of those surveyed expressed a desire to thank the researcher. The other half provided no additional comments.

5.10 Conclusions

The third research question asked what advantages, drawbacks, and challenges were associated with implementing the UDL method in the classroom from the perspective of both teacher and observer. Based on an analysis of the results of the questionnaire, we can say that there was no statistically significant difference between the control and experimental groups. However, there was a statistically significant difference between the two groups when it came to the open-ended questions. In addition, the results of the performance in the experimental group showed clear improvement in the photography skills of six SID, who

scored 100% on their evaluation. In the control group, five SID showed improvement (scoring 83%), and one student did not pass the course (scoring 16%).

When it comes to non-SEN, the results also showed a significant improvement; six students scored 100% in the experimental group and in the control group. However, there was a difference between the two non-SEN groups in terms of total test scores. Whereas all the students in the experimental group achieved a score of 100%, two students in the control group scored 100% and four students scored between 82 and 95.5%. Also, UDL can help foster inclusion among non-SEN education and students with special needs, because it relies upon student-specific presentation and assessment means based on individual student's abilities. In addition, the results of the most important obstacles facing UDL are the difficulty in understanding how to implement UDL, which is the difficulty of designing means of communicating information, assessment methods and means of engagement. The problem of the use of technology and the limited access of the Internet to schools in Saudi Arabia is one of the main obstacles to the application of UDL.

In contrast, the teachers limit some advantage and disadvantages of UDL application. The results make clear the benefits of UDL, which creates an interactive environment that allows for the use of new and varied teaching approach. The main disadvantages of UDL are that they are expensive in cost, time and effort.

Thus, the objectives of the current study are achieved, by knowing the impact of UDL on the education of SID learning photography with the ability to learn side by side with non-SEN students. Also, a new strategy has also been discovered that helps inclusion of non-SEN with SID into mainstream schools. Finally, the impediments, benefits and negatives that teachers face during the implementation of the UDL were identified in secondary mainstream schools. To achieve these goals, a mixed approach was used, which was based on the use of multiple tools to detect the impact of UDL and identify the obstacles to application from the point of view of teachers. These tools consisted of questionnaire, observation lists, open questions, and pre- and post-testing.

The results of the current study will, in the future, contribute to the development of research to find new strategies to help the inclusion of students with special needs from different categories. These results also help to focus on the application of UDL in mainstream schools at different age levels.

6 CHAPTER SIX: CONCLUSION

This chapter is the last in this thesis and will summarise the study. It will begin with a review of the limitations encountered by the researcher during the course of undertaking this research. The contributions of the study will then be highlighted, and recommendations and suggestions for future research will be outlined. Finally, the study itself will be summarised (objectives, results, methodology, contributions).

6.1 Limitations of this study

A number of limitations were faced, the most important of which was the small sample of SID students, SNSEN students, and teachers. Therefore, it is not possible to generalise the results more broadly to Saudi society. The reason for the small sample was that some school managers and teachers working in these schools refused to participate in the implementation of the UDL programme. Some teachers felt that taking part in this study posed an additional burden. In addition, as women are not permitted to enter men's schools, the study was carried out only in the female sections of the school, and so we were unable to include males.

This segregation is designed to enforce the Islamic requirement that males and females do not interact with each other, except where there is a family relationship, such as that between a father, mother, brother, sister, son, daughter, uncle, aunt, nephew, niece, wife or husband; if interaction is necessary, the female should be accompanied by a male member of her family. In Saudi culture, Saudi women would prefer not to be contacted by Saudi men, meaning that the researcher would have had difficulty finding a female teacher who was willing to take part in the study and be interviewed by a male researcher, which would have required more time to organise and undertake. Moreover, Saudi education policy (1995) stresses the separation between boys and girls in most aspects of school life. This includes provisions for separate buildings, separate teachers (male teachers for boys' schools and female teachers for girls' schools), separate training, and separate supervision; it is only in kindergarden that co-education is allowed. Therefore, this study, a focus male teacher represented one view, that of male teachers. Female teachers may have had different views and the issues in girls' schools may be different.

Usually researchers who conducted a qualitative or mixed methods approach in the Saudi

context selected participants who were the same gender as they were. For example, Alshahrani (2014), Albuhairi (2015), Alothman (2014) and Al-Kahtani (2015), all male researchers using qualitative and mixed method approaches, chose male samples, as they were restricted by the Saudi Islamic approach to governing male-female interaction. Also, Alanazi (2012) and Alhudaithi (2015), female researchers, chose female samples for the same reason. Thus, this study is not representative of the views of all teachers in mainstream schools in Saudi Arabia; however, it does reveal some fascinating insight into the views held by the male teachers who were interviewed.

The second limitation of this study is that it was conducted only in secondary inclusion schools, and didnot focus on kindergardens, primary schools or intermediate schools. The reason why secondary education was chosen was that this is the stage that provides vocational training for SID. Other schools, such as kindergardens, primary and intermediate do not offer SID student training in professional skills, focusing instead on the academic development of the student, which may include teaching computer skills, teaching them how to read and write, and teaching them the sciences. At the secondary level, the SID begins a transition to self-sufficiency by developing their professional and academic skills. However, it is likely that those at other types of schools face different issues. Further study should investigate these different contexts.

Given that some general education teachers refuse to work with SNSEN students and help them participate, this study was conducted only with teachers who teach SID students. Thus, the results may not be generalisable to other special education teachers or other categories. This limitation resulted from teachers not appreciating the importance of dealing with students with special needs. This challenge can still be traced back to the teachers' refusal to teach students with SID, a refusal that is driven by their unwillingness to accept SID students. In addition, there is a perception that teaching such students is very hard work and time consuming; most teachers view such a burden as problematic. Thus, they refuse to teach SID and SNSEN in the same classroom. A study by Gaad and Khan (2007) in Dubai revealed that general education teachers found that teaching SEN students required a lot of attention. They expressed reluctance to deal with such students, arguing that doing so would overwhelm them. These teachers argued that handling SNSEN with SEN was cumbersome; therefore, adding students with special abilities seemed like a lot more work than they could cope with. In addition, they pointed out that the preparation required for normal lessons was difficult enough, without the extra burden of SEN students. Gaad and Khan (2007) revealed

that most teachers feared the problems that SEN students may bring. They said that SEN students appeared sensitive, hence they would require more specialised attention. They feared being blamed in case anything went wrong, which might even lead to them losing their jobs.

Another study (Stanovich and Jordan, 2002) revealed that teachers feared the sort of pressure that comes with teaching SEN students. They expressed concerns over pressure from the school administrators and the parents of children with SEN. They saw that most parents were already protective of the normal children and therefore could not imagine the kind of pressure parents of SEN kids could impose on the teachers. The teachers expressed concerns that the parents of SEN students would be too overprotective, hence they would be under a lot of pressure.

In addition, they revealed that they were always under pressure from the school administration to take very good care of the students under their care. They imagined that the kind of pressure associated with taking care of SEN students would be too much, especially given that the administration tended to deflect blame onto teachers in the case of accidents or injuries. Mullick et al. (2012), in a study on Bangladesh, highlighted the uncooperative nature of teachers, who expressed concerns that SEN students might not bond well with other students and cause classroom issues. They observed that the environment may not be conducive to SEN students learning and playing together with SNSEN.

Another possible reason is the lack of training for teachers on how to deal with students with SID. This makes many teachers unqualified to deal with SID students, due to the special attention they require. The lack of cooperation by teachers is therefore a product of their fear of interacting with them. The teachers perceive SID students as being too complex, hence they look to avoid such complication. A study revealed that teachers had limited knowledge on how to cater for SEN students (Lifshitz, Sullivan, Hovda, Wieloch and McIntosh, 2004). This study revealed that most teachers potentially feared handling SEN students, owing to the fact they did not receive any special training. Another study suggested that teachers expressed concerns over unpredictable behavioural changes associated with SEN students (Gal, Schreur and Engel-Yeger, 2010). Without the required skills, they were not comfortable catering for students with special needs, citing a fear of embarrassing situations and unsafe outcomes. As a result, they feared change in school programmes that might occur due to the inclusion of SEN students. Chhabra, Srivastava and Srivastava (2010) revealed

teachers were not optimistic about the classroom environment and were unable to accommodate SEN students. They said their training was for a normal class environment, and that catering for SEN students in the normal environment was beyond their training. Therefore, the current study has included the teachers who gave their consent to participate. These teachers provided useful and supportive results for the field of special education. There are other factors that inhibit the effectiveness of this study. This limitation of sample size is due to the education system and location. The education system in Saudi has distinct levels. Therefore, this study could only focus on the high schools that teach SID (Alsalem, 2015 a). It is therefore challenging to assess the influence of UDL across various levels of learning. This means that the research is limited to a particular level, reducing its relevance to the broader teaching and learning process. Essentially, a large portion of the education system is ignored by the study.

Furthermore, this study was carried out only at schools in Riyadh City. Therefore, the results may not be generalisable to other cities in Saudi Arabia, which may have different demographic make-ups or programme structures, or have different cultural backgrounds. Saudi Arabia is a country rich in culture and diversity (Alsalem, 2015a). This means that teaching environments are different. The study was only conducted in Riyadh because of limited financial resources. The budget required for conducting research across different cities is large, primarily owing to the size of Saudi Arabia (Alsalem, 2015a). It is not just transportation and accommodation costs that need to be considered; the need for more manpower when covering more than one city is important. A study conducted across cities must have enough skilled researcher manpower to be able to meet the research objectives. Moving across cities would mean covering more schools. For the study to be completed on time, a team of skilled professionals would need to be sent across various cities to cover more schools. The team would then require coordination from a temporary control centre. A large team would entail extra costs and more logistical challenges. The complications of working with a large team may also derail the entire study. This is due to the complex and unpredictable nature of human beings, who require good human resource management. Motivating a team is also a big challenge financially, since this kind of research might involve tedious work and present many challenges. Thus, the researcher focused only on Riyadh because it is the capital and the largest city in KSA. Riyadh will be representative of the Saudi society.

Another limitation with which the researcher struggled was an inability to find any research explaining how to design UDL classes for students with SID and SNSEN. This led the researcher to believe that the idea that classes should be run using UDL may be a new topic. This limitation is attributed to the fact that little effort has been put into studying and researching UDL. Many researchers in the field of education do not focus on this area because of the numerous challenges it poses (Rao, Ok and Bryant, 2014). This therefore results in limited research material being available for reference, forcing the researchers to devise particular aspects of the study and apply their creativity.

Many issues can arise out of this lack of pre-existing work, since methods adopted in research have possible unknown outcomes. In research, this increases the risks involved and makes the research more challenging. Additionally, preparing for research requires extensive literature review. Researchers in UDL often find that limited references are available when conducting their literature review (Rao et al., 2014). This often makes preparations for research frustrating and shallow.

There are aspects of research in UDL, such as the technology suitable for SID students, that little research has been conducted on. This area has been the subject of limited research since most innovators and computer system developers have little interest in UDL. It is therefore very challenging for researchers to gather sufficient information in this regard.

Another aspect of UDL that has been under-studied is the kind of classroom environment suitable for the inclusion of students with SID (Rao et al., 2014). UDL has therefore been a challenging area to research, since most institutions lack this kind of balanced learning environment. In addition, pedagogical methods are still not advanced enough to accommodate SID students (Rao et al., 2014). The learning and teaching methods are not yet developed enough to foster an inclusive learning environment. This makes it difficult for researchers of UDL to try and find sources relating to pedagogical methods. Thus, in this study, the researcher translated books and resources about UDL from English to Arabic to suit with Saudi culture. Also, the researcher worked hard to read books and watch video clips that explain how UDL is presented in the classroom. The researcher also tried to deduce how to design classes and distribute assignments to students.

Another limitation that was faced was the difficulty in designing the photography instruction software used for this study. The software design process was time-consuming and cost £1,000. It also required a substantial amount of effort. Software development is a complex process, one that is technical, labour intensive and expensive. Developing software that

could aid the learning of regular students is equally complicated. This is because the software has to mask its complexity so that the children can find it easy to use. This is one of the aspects that make many programmers shy away from getting involved in software development for learners, and this makes it even more challenging to develop software for UDL. Designing software to help students with intellectual disabilities is a therefore very resource-intensive task. The development team has to factor in the SID students in the learning process. Futhermore, the software has to make use of additional or special hardware, which means extra coding has to take place (Hall et al., 2015).

In terms of the software, special features have to be developed. These features are often complex, due to the learning difficulties faced by SID (Hall et al., 2015). In addition, the software has to be customised to suit different types of SID and SEN students. Customisation of this nature is time consuming and requires highly skilled professional programmers, who are costly to acquire. Another study conducted by Narkon and Wells (2013) showed that software developed for students with SEN may require integration of additional software, such as graphics software for visual learning. Such integrations with other software are usually complicated and require a lot of testing. Testing is time intensive and requires a lot of resources, making it an expensive venture. This study demonstrates the fact that software used for UDL are dependent on other systems and software.

Another study looked at how technology is integrated in UDL (Benton-Borghi, 2016). The integration of software in UDL was discovered to be very challenging, especially when developing the software. The user interface was particularly complex, because the user has learning difficulties. Hence, the software took a lot of time to develop and required a large team. Each member of the development team worked on a particular part of the user interface. The fact that all of the UDL educational materials available used in the design of the software for the study are in English and had to be translated by the researcher further complicated the process. The researcher also struggled to find images and drawings that suited the Saudi Arabian environment. In order to solve the financial problems or address the cost of designing the program, the researcher obtained financial support from the Saudi Embassy to design the educational program "Learning Photography".

KSA is one of the most influential countries in the Middle East due to the religious significance of places like Mecca (Alhammad, 2017). In addition to its religious background, Saudi Arabia is home to a rich Arabic culture. Despite the fact that there are a large number of people who have learnt English, the majority of people in the KSA speak Arabic. Hence, teachers faced

challenges when using software developed in English. This meant that translation had to occur for the users to fully comprehend the software. However, some meaning might have been lost in translation, further complicating the situation. Therefore, as mentioned previously, the researcher has translated all UDL resources into Arabic.

Apart from language, Saudi Arabia has numerous cultural practices originating from Islamic culture. This sets the country apart from many countries across the world, which have adopted and integrated foreign cultures. Saudi still firmly practices Sharia law, which has been integrated into the education system (Alhammad, 2017). Due to the culture in Saudi Arabia, some photos or graphics may not be allowed, either for children or adults. Most countries in the world have embraced technology and compromised their cultures in the process. However, Islamic countries like Saudi Arabia still uphold their culture very firmly, despite the adoption of technology. This, therefore, presented challenges for which graphics would or would not be allowed. It made content gathering a challenge, because of the amount of time it took, and meant that the cost involved in the project and the completion of obtaining the data were both extended. In general, the content and design of the software was heavily affected by the culture of Saudi Arabia. For example, images of women showing their hair or wearing short skirts could not be used. Furthermore, the software interface required customisation in order to suit the culture of KSA. Also, language translation in UDL programming from English to Arabic is a very complex process. Therefore, the researcher selected and modified resources, images and videos to suit the culture of KSA.

The lack of specialists in the field of software design was one of the most important limitations impacting the results of this study, as it was difficult to find computer programming specialists, especially those specialising in interactive software design (the type of software needed for this study). There are very few programmers that have the skills or insight needed for UDL software development. This is spurred by the fact that UDL is mainly focused on teaching and learning and the courses are mainly designed for teachers and instructors. This makes it challenging when developing software designed to aid the implementation of UDL (La, Dyjur and Bair, 2018).

The programmers who do engage in software development in this area have little or no understanding of UDL (La et al., 2018). It therefore takes time for them to get up to speed with the concepts involved. This means that additional time is needed for the development of the software. In addition, most programmers find developing such software very engaging and complex and hence demand hefty remuneration.

The design of software is usually the responsibility of the user. Since this kind of software focuses on students with special educational needs, the design process is a bit more complicated. The features required are very complex in nature which requires a high level of programming skills. Furthermore, a lot of research needs to be conducted by the programmers, since the technology, at least in terms of hardware, is relatively new. The software developers also need to be creative and innovative in order to meet the unique needs of SID students.

The development of such software also requires a team of software developers, each of whom have to complement one another's skills. Since the software is complex and time consuming, teamwork will make the development process faster and smoother. After development, testing has to be done. This is to address any safety concerns that might arise from using the technology. Since the primary users are SID students, safety and friendliness of the software is paramount. Testing and debugging requires a lot of time and requires feedback from users (Ellis-Robinson, 2015). Regarding the difficulty of finding computer programming specialists, the researcher asked for help from faculty members in the Department of Computer Science at King Saud University in finding a suitable person to design the educational software used in this study.

6.2 Research contributions

This study uncovered the effects of UDL on learning photography for SID and SNSEN students, as well as the barriers, advantages, and disadvantages facing the application of UDL from the perspective of teachers in Saudi Arabian schools. The findings of this study and their implications have provided data and information for understanding UDL implementation in Saudi Arabian schools. These data may help teachers and professionals develop a deeper understanding of UDL, such as knowledge of the concepts and the advantages, disadvantages, and basic principles of this strategy.

This paper will add to the growing database of information on UDL. In this study, we have seen that the information available for use as reference material does not meet UDL requirements. This is because there is an increase in the number and complexity of SID and SNSEN students. This study will therefore provide useful information for future research. We saw above that there is limited reference material available; therefore, one contribution of

this study is that it will provide a good guide to future researchers, particularly those focusing on the Middle-East.

Another contribution is in the area of technology and software development. This study has demonstrated that it is possible to develop software for SID and SNSEN. It will encourage more software developers to engage in development in this area. It will also provide meaningful resources for software development communities. Technology is a crucial aspect of UDL, since it makes the implementation process smooth and interactive. In addition, this study has made improvements to the kinds of similar software previously developed, providing genuine hope for more innovation in this area. This research has shown that there are few studies about the application of UDL in Saudi Arabia. The study conducted by Alsalem (2015a) showed that there are efforts under way to implement UDL in Saudi Arabia. Despite the numerous challenges outlined in this study, there are positive steps being taken by the Ministry of Education and other education stakeholders to ensure that UDL is successfully implemented. The results of this study have offered hope for the inclusion of SID and SNSEN in the general system. The results also indicated that there was willingness to support UDL by the stakeholders involved. In addition, there is increased interest in implementation of UDL and more efforts are being put in place (Alsalem, 2015a).

Also, the information derived from the results of this study may help develop a stronger practical understanding of UDL. In other words, it may help teachers apply UDL in their classes and to understand how the classroom should be divided, be more familiar with the designing of appropriate materials for each curriculum, and how to organise students based on the UDL method. This study has revealed a way in which inclusion can work productively in a classroom with SID and SNSEN students. It offers guidelines specifically to teachers or facilitators. Practically speaking, SNSEN students and those with special educational needs will never be equal in terms of abilities and understanding. The learning process is different in this regard.

The research was successful in finding a strategy that teachers could use to find a balanced approach to classroom organisation. The researcher was able to devise a formula that can be applied by teachers to ensure an appropriate seating arrangement for all students, including SID and SNSEN. This formula involves finding the strengths and weaknesses of all students and grouping them according to how they would best help each other. The distribution will be achieved by mixing the students with special needs with those who can help them cope

with SID. In this way, students can help each other to learn without disrupting the flow of a lesson. Teachers and facilitators can use this technique in their diverse classes. Spencer (2011) suggests that there has been no balanced approach to classroom distribution of students in UDL. Previous methods have not yielded much fruit and there has been lack of coherence in the distribution techniques suggested. Therefore, the researcher succeeded in finding a working formula that has had a great impact on the implementation of UDL by teachers.

Integrating students with SID with SNSEN brings many benefits. As this study has shown, the inclusion of students with SID helps other students appreciate the importance of being intellectually capable. Therefore, the students will support each other in their learning. Furthermore, students with SID are able to feel as if they are part of society and not outcasts. It encourages such students to be confident in achieving their dreams, despite their conditions.

The positive results of this study on the inclusion of SID and SNSEN students also has benefits for the teachers, as they are able to engage in good class management. Since the distribution of students breeds harmony, the teachers will have an easier time managing the class during lessons. Furthermore, the learning process will be smoother, hence the teacher will be able to achieve lesson objectives and assist all students in a simple way. Teachers will therefore be required to upgrade their professional skills and learn the new strategies revealed by the study. The success of the implementation of this new strategy will depend on the skills teachers will require to make them more competitive. The acquisition of these skills can happen through special training. This research revealed that KSA lacked the appropriate strategy required to implement UDL and foster the inclusion of students with SID. This was revealed by the challenges faced during the study, which showed how teachers struggled to cope with an integrated class during learning sessions. Waitoller and King Thorius (2016) reveal the struggles researchers face in seeking to find suitable strategies to foster the inclusion of students with SID. The struggle to achieve inclusion is highlighted by the fact that teachers felt overwhelmed when they integrated SID and SNSEN students. A similar study by Westwood (2018) revealed the challenges teachers face during the inclusion of students with SID. This highlights the struggles involved in classroom management, which left teachers exhausted at the end of every lesson. Consequently, this study will be helpful in UDL implementation strategies.

The educational software "Learning Photography", designed specifically for the implementation of the current study to teach SID students professional photography, will contribute significantly if it is used in other classrooms. Furthermore, it can potentially be disseminated as part of the basic curriculum in mainstream secondary schools. The design concept of the software will also help designers and researchers to design software for other curricula or courses; the effectiveness of the software was explored in the discussion chapter (see §5.2.1). The interactive nature of this software improves the learning experience for SID students. The interface is very friendly, allowing the students to interact with it and learn the skills easily and quickly. The features of the software make learning enjoyable for SID students, meaning they maintain interest and focus on the subject matter, photography, as discussed in the methodology chapter (see § 3.6). The user friendliness makes the work of the facilitators and teachers easier, since students do not struggle to learn the skills required.

As discussed above, the field of UDL has been lacking in interactive software, since most programmers avoid the field because of the complex nature of the users involved and the lack of knowledge of special education. Thus, the development of the Learning Photography software is a useful contribution in an area that is lacking in terms of software for SID. This area requires software like the one in this study to make the learning of skills easier. In addition to a lack of learning software, there is also a deficiency in the number of professional Programmes for teachers of SID and SNSEN students. A study by Alcalde, Navarro, Marchena and Ruiz (1998) recommends the use of a computer-based teaching and learning approach for students to help them learn better. However, the study points out the challenges involved in the scarcity of software in this field. Another study shows that, in the implementation of UDL, computer software is integral (Armstrong, 2012). The same study highlights the few specialised professional courses available to equip teachers with the requisite skills as a drawback to the inclusion of SID and SNSEN students. The implementation process requires that the teachers have special skills in handling students and operating the software that is used. Moreover, the results of this study place an emphasis on developing the professional skills of SID students, which will help them become independent in the future. The professional development programmes have numerous benefits in terms of the skill sets they offer. Many SID students usually have to depend on other people when performing certain tasks. In a society that puts a lot of emphasis on the skills acquired, the professional development of SID students will help equip them for future opportunities by providing them with a certain level of competitiveness.

Currently, no studies have been conducted that measure how effective UDL is on the professional development of students with SID. The main reason for this gap is the lack of extensive research in this particular area. The professional development of students with SID is an area that is difficult to research because of the complexity involved in measuring progress. In addition, the main focus during training is on professional skills .

By focusing primarily on professional skills, the UDL specialists fail to prepare the SID students on how to be independent in a society that regards them as a burden. Therefore, this study provides information on how to employ UDL to train students on professional skills. Apart from professional skills, the professional development programme in this study equips the students with life skills. These life skills help them integrate into society by enabling them to cope with different challenging situations and circumstances. They are able to interact with others without feeling inferior because of their condition. The results of this study will be useful to the Ministry of Education as they plan the implementation of UDL. The findings will help decision-makers better envision the possibilities of UDL application in mainstream KSA schools. This study provides the Ministry of Education with techniques that will increase the chance that the implementation of UDL will be successful.

An emphasis in this research is on training teachers in the skills and strategies required to foster inclusion. The skills can be acquired in various training sessions and workshops that the ministry can organise for teachers. Training teachers will be fundamental in tackling the challenges that are anticipated in the course of the inclusion process in a way that avoids chaos and crises. With those skills, teachers should be in a position to judge situations and help avert any looming crisis. This will make the inclusion process much smoother. In addition, those skills will help teachers create an environment that is friendly for SID students, one that can help them learn with minimal difficulties. Furthermore, professional development of teachers will help strengthen future studies. As a result, more improvements can be achieved during those studies, since previous challenges would have been by-passed. Hence, the implementation of UDL will continue to be more successful, as more solutions to challenges will be formulated.

The implementation of UDL will support the 2030 vision of the Ministry of Education, which specifies the need for change in the education system to suit the culture of Saudi society. The vision also stipulates that training in the use of technology is necessary at all stages of education, something that is not required for UDL implementation. The results of this study

suggest that UDL may be a successful strategy for inclusion of SID and SNSEN. In general, the results of this study will add to the body of information accessible to researchers, thus helping future studies and further developing the field of education.

As mentioned, this study involved the development of software to help teach photography. This software will help the Ministry of Education in its vision to provide software that can be used to train teachers. The software also provides an interactive platform that will help trainees to learn the skills required to operate similar software that might be developed for UDL. As a result, the vision will grow closer to realisation because of the practical acquisition of skills that will take place as people interact with this software.

Theoretical significance: In comparing the outcomes of this study with the previous studies, it seems that it is easier to convert the academic curriculum into interactive computer software (discussed in depth in § 5.2.1). However, professional curriculum is more difficult to convert into an interactive computer program. While most studies show that learning academic skills such as reading, writing, and mathematics are more challenging than learning motor skills (Watson and Gable, 2010; Dweck et al., 2014), the UDL/ computer program supported students in this practical skill less well than would be expected. This study therefore urges researchers to understand the difference between applying UDL to teaching and applying professional or motor skills to academic education.

Those studies found that employing the UDL framework improves the special education system by guiding teachers in the use of alternative methods to evaluate and display curricular content, which will help SID integrate into mainstream classes. The results also demonstrated the need to train teachers on how to use UDL.

LaRocco and Wilken (2013), Murray and Novak (2008), and Alkahtani (2013) focused on training mainstream school and special education teachers in the UDL method study using a quantitative approach. By contrast, the current study used a mixed methods approach to collect information about the effect of UDL on the teaching and integration of students and the obstacles to implementing UDL. Thus, further research using a variety of methods and tools (e.g. quantitative and qualitative methods, questionnaires, observational studies, interviews, open questions) to confirm the data reported in this study could be undertaken. Moreover, studies should collect data from teachers after they have had practical experience with UDL in order to identify the real-world obstacles to implementing this method in the Saudi context. Notably, however, repetition of information was observed to bore non-SEN

students, even when means of delivering said information varied. This boredom likely reflects differences in the needs of SID and non-SEN students; teachers explained lessons in two sessions to address the needs of SID, who may need more than one session to master the skill correctly.

However, in the current study, opponents of UDL argued that it is useful only in simple lessons, such as drawing and home economics, but not in more academic disciplines such as chemistry, physics, and mathematics. This finding contradicts findings like those of Coyne et al. (2012), who found UDL improved the reading skills of SID. Still, two studies are not enough to allow for generalization. In addition, teaching academic skills such as maths and science is difficult compared to imparting SEN students with motor or professional expertise. This is because it needs high mental processes. To address the maths challenges among learners with SEN, teachers need to respond to intervention. It is essential to use benchmark assessments to identify the students who pose difficulties in learning such subjects and offer them tiered intervention programmes (Geary, 1994). These incorporate the recent intervention plans such as Conceptual Model-Based Instruction or Cognitive and Metacognitive instruction. The programmes are known to improve academic skills performance in mathematics among the SEN students.

Moreover, the results indicate that it should train teachers on how to use UDL for 3 to 4 days, and not just giving teachers theoretical information about UDL. Whereas most of the studies focused on teacher training theoretically on the use of UDL, through the use of workshops (Alsalem, 2015a; Alquraini and Rao, 2018a; Shah, 2012). Therefore, this result will help researchers to train teachers practically, before starting any experiment to use UDL.

6.3 Recommendations

The following recommendations are drawn from the findings of this study. These recommendations are derived mainly from the limitations of the study. The limitations showed the obstacles researchers have to overcome in order to meet the objectives of the study. These recommendations will help future researchers conduct more successful studies by navigating around those limitations, assisting in this area by preparing researchers in advance. It is important that the recommendations reach the relevant parties, which include

government agencies, the school administrations, the teachers, and other stakeholders. Doing so will make sure that the implementation of UDL can be improved.

Specialists in UDL go through many challenges, especially when they try to integrate students with special needs and the SNSEN students. Since this is still an area under research and experimentation, there is little success when relying on specialists. This means that most specialists have to try and cope with their situations.

The first challenge is the amount of work involved in handling special education students. Dealing with both SID and SNSEN students always requires a lot of hard work and attention. Most specialists said that they go home really exhausted at the end of most work days, because they are usually under a lot of pressure from the parents and school administrators. The specialists are still expected to help the students perform well during their assessments. Another source of suffering for specialists is the integration of technology. Teaching students with special needs how to use technology is a daunting task. Most specialists find it hectic and struggle to help these children grasp the skills required to use technology. In addition, using the same technology when teaching or helping students to learn is not easy. Many often require a lot of support. There were multiple limitations and challenges faced by the researcher. Aside from challenges, there were numerous discoveries and a number of grey areas and learning points. All these are combined to offer up recommendations. These recommendations should be adopted to foster progress in UDL and teaching and learning as a whole.

First of all, the current study recommends teacher educators use of UDL in schools as a strategy that helps inclusion of SEN with non-SEN students. Where, this study confirms that UDL improves the SID and SNSEN teaching process. This strategy has also helped integrate students through the realisation of three UDL principles (engagement, expression, and representation). Therefore, this study's results support the use of the UDL method in mainstream schools at all stages, following further testing of this method. The findings of this study will go a long way in helping other on-going experiments at different stages. Particularly, the results of this study will provide a model for implementing UDL in different types of classrooms. Many experiments in UDL face their biggest challenges at the teaching and learning stages. Therefore, the study's findings will be helpful in terms of the strategies to use in order to succeed in helping SID and SNSEN students learn. It will provide a guideline

for specialists involved in teaching students with special needs that will help them conduct UDL experiments more smoothly.

Another challenge the teachers face is in finding it difficult to integrate SID into the general education stream. This is mainly due to the amount of effort required to observe learning differences in a diverse classroom. After integration, teachers still need time to adapt to the new changes and be able to focus attention on learning differences. This means that they may, at times, miss out on differences in students' learning curves. This can lead to SID being left behind in attempts to foster inclusion.

As a result, this study recommends that the Ministry of Education and teachers of special education use the UDL programme in curriculum design for the SID with the SNSEN students in the different curriculum. The results of the current study have supported this recommendation and emphasized the benefits of using multiple methods when considering individual differences between SID and SNSEN students, and seeking to improve the quality of teaching and learning. UDL helped achieve inclusion in this manner. It is ideal for designing a curriculum that suits the needs of all students and that is based on students' preferred methods of learning and evaluation.

This will help the implementation of UDL across the KSA and other countries around the world. In addition, the use of UDL will make the work of the specialists easier, by providing a guideline that can be used to reduce the challenges that might come with integration.

Using the UDL programme in curriculum development will bring several important benefits. The curriculum will be sensitive to the issues around handling SID and SNSEN students, thereby providing suitable solutions to the issues discussed above. In addition, the curriculum will be able to employ the right technology to make the implementation of UDL possible.

Another benefit is that the curriculum will be progressive, in the sense that it will be able to bypass existing hurdles. The implementation of UDL is not easy, hence having a curriculum that is founded on UDL principles will make the entire integration process seamless. This will occur if all special needs are taken care of. Doing so will mean that they will be able to accommodate SID with SNSEN through curriculum changes that respect the special needs of students.

We saw above that a failure to understand UDL was a problem that teachers faced. They did not understand UDL, because, for most of them, it was a new concept. Therefore, they had

little or no information about it. However, the attitude of the teachers on this matter, even after learning about it, was negative. This made training difficult. Most teachers viewed UDL as a burden, as it would potentially increase their work load and lead to increased pressure being placed on them by education stakeholders. In addition, they found the concept to be complex. The inclusion of software and new pedagogical techniques further compounded the challenge. Teachers were unable to implement UDL using theoretical educational workshops. Therefore, one suggestion from the current study is that the Ministry of Education should pay attention to, and conduct, training courses for all teachers in regular schools, including both special education teachers and general education teachers. By doing so, they will encourage cooperation between teachers and foster successful inclusion. Teachers should be trained in both the practice and the theory of UDL over a period of three to four weeks .

Moreover, training of teachers is fundamental to the successful implementation of UDL. Studies have shown that the skills acquired by teachers for the inclusion process help in making the integration process smoother (Benton-Borghi, 2016). This is so because the teachers will be well equipped to deal with challenges arising from attempts to foster inclusion. In addition, the teachers are better equipped to create a learning environment that is conducive for all students by effective student arrangements in classrooms. Another study by Gaad and Khan (2007) showed that teacher training helps them to develop a more positive view of managing students. This is because, with the right skills, teachers view integrated SID and SNSEN students as being less of a burden than initially perceived.

An additional obstacle faced by teachers during the study was a lack of financial support and smart devices. A study by Stanovich and Jordan (2002) highlights financial constraints as one of the challenges cited by teachers during the design of UDL. The teachers pointed towards budgetary drawbacks as a hindrance to an ideal UDL plan. Most school administrations found the budgets they required to be too big, hence they asked them to revise them or, in some cases, asked them to shelve their plans for future consideration.

Another study cited technological challenges. Indeed, the teachers in this study pointed towards a lack of technological devices (such as smart devices) as one of the challenges of the implementation. They acknowledged that they needed the help of technology to make the integration smoother and more interactive (Hall et al., 2015). However, these devices were found to be expensive, and hence posed challenges.

To overcome this problem, this study recommends that UDL should be adopted by the Ministry of Education and Saudi policymakers to provide resources to schools that were previously compelled to spend their own money. This will inject the required funding and overcome concerns over budgetary strain. With the funding disbursed to various schools, teachers will be able to acquire the smart devices they need. As a result, teachers will not view UDL as a burden. This will provide enough motivation to implement UDL. In addition, the Ministry of Education's involvement will offer a support boost, because any challenges faced during implementation can receive further support. This creates confidence in teachers when it comes to the success of any attempts at integration (Mullick et al., 2012).

One of the problems faced by the teachers in this study was a lack of experience using electronic devices. Therefore, free workshops should be established to train teachers to develop the skills required to use a range of technological devices (such as projectors, computers, iPads, etc.). These challenges were evident in similar studies; most schools do not frequently use technology. Hence, teachers had very few skills upon which to draw when asked to use these kinds of devices (Benton-Borghi, 2016). This study also observed that the technological training they received in college was mostly theoretical, hence they were not very well equipped. In addition, the study found that the younger teachers had better skills than the older teachers because they more frequently used technology at home. It is therefore important to identify the level of technological literacy and to train the teachers more effectively (Benton-Borghi, 2016).

Another problem revealed during this study was a lack of specialised multimedia software designers and a lack of resources for UDL suitable for Saudi culture, including resources in Arabic. This problem is also cited by other studies, which suggest that many developers opt out of this field due to the perceived complexity of designing such software. In addition, the development of software in this field requires knowledge and skills of special education, which most software developers do not have. They therefore find such projects unattractive (King-Sears, 2009). As a result, the present study recommends for Saudi policymakers to develop of a special centre for UDL to help schools design interactive software for other curricula, such as science, mathematics, and reading, and so which may help address this issue. This centre would also modify and alter existing UDL resources to better suit Saudi culture. Developing UDL software in Arabic may also improve how teachers cater for inclusion of SID and SNSEN students in Saudi Arabia. The customisation of this software into

Arabic will help teachers in their attempts to use it. As a result, the teachers will be able to teach the students how to acquire knowledge and skills in a simpler way.

Teachers of SID students face a number of challenges. They have to cope with the increased attention they have to give to these students, owing to their special needs. Studies have shown that even lesson preparation takes longer than normal and a lot has to be factored in. In the end, most teachers end up putting in more effort than normal. In addition, they face a number of challenges when they integrate technology, because a lot of patience and time is required when SID and SNSEN students are being taught how to use technology (Alhammad, 2017).

As a result, this topic needs to be the focus of extra attention. The Ministry of Education should consider reducing the burden on special education teachers and providing additional assistants in mainstream classes. Providing teaching assistants will help reduce the pressure and lead to better classroom control. In addition, the Ministry of Education should reduce the number of students in each class. This will give teachers the time to help each individual student. The ministry should also require school administrators to reduce the pressure on teachers by reducing the amount of paperwork they need to deal with. This will free them up to focus on students with SEN.

These recommendations are likely to help decision-makers in education, especially in the field of special education, to further develop the provisions for teaching those with special needs and foster their inclusion in Saudi society. Hence, these recommendations may lead to the more effective implementation of UDL in the KSA. In addition, using this new strategy will likely promote positive changes when it comes to inclusion.

These recommendations will also help the students adapt to changes much more quickly. In terms of the learning process, these recommendations will help students acquire skills in a simpler way using interactive software. Through a concerted effort, the implementation of these recommendations will increase the chances of inclusion succeeding and increase the chances of decision-makers making appropriate decisions that will improve student outcomes.

6.4 Suggestions for future research

A number of areas for future research are apparent. It will be important that future research investigate to examine the effectiveness of UDL on more than one curriculum (such as academic skills or motor skills). This proposal can aid in the future implementation of UDL in mainstream schools in a number of ways. There are many challenges that the inclusion is set to face during implementation, including an inability to balance the needs of SID and SNSEN students in the same class and not fostering an environment in which they can interact.

This proposal of the UDL method provides solutions to these challenges in a way that is practical and easy to implement. In addition, this proposal provides a technological breakthrough by offering an interactive platform that will improve the learning experience of SID and SNSEN. It also addresses the difficulties teachers face during the inclusion process and suggests several ways to assist them as they cater for special needs students and stop them from feeling overwhelmed. UDL has amazing benefits for students with special education needs. Through the use of technology, including smart devices and interactive software, the students are able to acquire academic skills, such as learning how to speak a certain language (Meo, 2008). Apart from educational skills, the students can also acquire professional skills, such as photography. This makes them competitive enough in the job market; hence they can be absorbed into various organizations. As a result of UDL, the students are able to gain independence, which boosts their confidence and self-esteem (Meo, 2008).

In future work, investigating the impact of UDL on training SID students with SNSEN in male schools might prove important, given that the current study focused on women's schools. Male and female students differ in their physical appearance and physiological behaviour. Since this study faced challenges associated with gender separation, this study cannot be technically applied to both genders. The physiological and biological differences in students translates to differences in learning and acquiring skills (Waitoller and King Thorius, 2016). However, this study provides useful methods and techniques that can be used in the inclusion process. The implementation of the recommendations in this study will make inclusion in KSA smoother and more effective. Including SID and SNSEN students usually results in many challenges. This study can be used to help education stakeholders tackle the issues associated with inclusion that were discussed in the literature review.

Another area is the use of personal interviews to gather and discuss more information regarding teachers' attitudes toward UDL. Particularly important is the need to gather as much interpretive data as possible in order to better understand the barriers to using UDL in Saudi schools. This is desirable for future work. This suggestion to use interviews will present several unique benefits. For instance, interviewing will provide the opportunity for the researcher to ask questions that uncover particular information from the interviewees. In addition, the questions can be altered depending on the mood of the interviewee. Interviews also provide a chance to receive instant feedback that can improve the study. This study made use of diverse data collection methods, including questionnaires and observation. However, using interviews is the best option for UDL studies, because certain challenges are best learnt about face to face by directly asking teachers. They also allow the researcher to ask extra questions, meaning that additional detailed information can be gathered.

Further research is needed in order to conduct further knowledge about the acceptance by SNSEN students of students with special education needs. This is important, because many studies on the topic are outdated. As UDL continues to grow in popularity, it is vital that more research continues to be conducted on how SID and SNSEN students relate to one another. It is equally imperative to know how students are adapting to the new learning environment in order to know what areas to improve on.

Further studies should investigate others ssues related to UDL, such as its impact on student teaching and its advantages and disadvantages and barriers to implementation across all cities and villages in KSA. This is because there are differences in the infrastructure and resources across different cities and villages, which may affect the results. This is particularly important because the challenges that arise during implementation need to be addressed in order to adequately foster inclusion. This study has focused on different aspects of inclusion and has offered solutions to address the challenges that we uncovered. It will, therefore, benefit future research and implementation by providing good references and important guides to fostering integration in the context of UDL.

Investigation of the impact of UDL on education for people with special needs in general is another significant area to be explored. This will involve recognising all types of special needs, for example hearing disabilities, visual impairments, motor disabilities, autism, hyperactive and attention. In these cases, UDL will be able to reach out to all students, ensuring that no-

one is left out. Researchers must explore the effect of UDL on different categories of disability so that we can generalise the results.

Future research might focus on UDL with SID students at various levels, such as primary, intermediate, kindergarden, and university levels, as different ages and categories are a crucial variable impacting the results of such studies. Since students with special intellectual needs are present across all levels of education, it is important that UDL takes into consideration the different levels. This will help future studies identify the different methods and techniques to be used by their respective teachers and facilitators, in order to ensure continuous progression from one educational level to another.

Another area is to compare UDL with other strategies designed to help students with special needs, and is an interesting topic for future work. This will help us to understand the strategy that will best serve their needs. Apart from UDL, there are a number of other strategies that can be used to teach students with SEN. This includes direct instruction, learning strategy instruction, peer education, self-education and multi-sensory approaches, amongst others (Waitoller and King Thorius, 2016). Comparison of these strategies provides important lessons that can be adopted by UDL in order to strengthen it and make it more appropriate. UDL is among the best strategies for teaching students with special educational needs due to its comprehensive and dynamic approach, which guarantees good results. This study focused on the strengths of UDL in fostering inclusion, making it suitable for use in KSA and other countries across the globe.

Future studies could fruitfully explore developmental of professional skills further by use of the educational software adopted for the current study that is designed as one of the tools of UDL to teach SID and non-SEN students. It is a question of future research to investigate the impact of this software in expanding photography education for non-SEN and SID students together. Also, it can help to know the effect of this software on the teaching of photography skill for more than one category of SEN and non-SEN. The results of this investigation will help to develop the field of professional independence for students with SEN, making them more independent and self-reliant in society.

6.5 The conclusion of the study

This study applied UDL to teaching students with intellectual disability (SID) and non-special education needs (SNSEN) students in an inclusion photography class, focusing on teachers'

opinions about the importance of UDL and the advantages and disadvantages of UDL, and uses these findings to evaluate whether UDL can help integrate SID and SNSEN students in the classroom. This study may make a significant contribution to the literature because research on inclusion of special needs and non-special needs students has tended to focus on the development of academic skills, rather than professional skills. Indeed, there is a lack of research that focuses on strategies to help train SID in careers where they can be independent. Thus, in this study, SID and SNSEN students were trained in photography, a profession that might help them live more independently. This research, moreover, is the first to study the impact of UDL on integrating SID and SNSEN in Saudi Arabian schools.

Therefore, the study explored the advantages and drawbacks, as identified by both students and teachers, of implementing the UDL method in vocational programmes. Furthermore, the study examined the advantages, as identified by teachers, of using the UDL method to integrate SID with SNSEN in the same classroom. Those aims were realised by hosting a workshop to explain the three principles of the UDL and train teachers in how to apply this method to teach SID and SNSEN in the same classroom. The results included a comparison of the opinions of teachers who attend the UDL workshop and those who did not, based on data gathered in a questionnaire and observations. Finally, this research explored the effects of UDL on the teaching of professional photography skills for SID in Saudi Arabia. The photography profession was chosen from the academic plan of students by teachers for SID in mainstream schools. To achieve this goal, the research offered up a comparison of the performance of the SID using the UDL method with that of female students with SID who were taught using other strategies by teachers in control and experiment groups.

The results of the study showed that UDL more adequately improves the teaching of SID students compared to traditional methods. Teachers in the study also noted that UDL contributed to the inclusion of SID students with SNSEN. UDL has numerous advantages; for example, it uses a number of ways to communicate information and evaluate students and it displays information commensurate with individual student's abilities. On the other hand, there are some disadvantages to UDL, the most important of which is that it takes time and effort to implement. The cost of UDL design can be quite high. Most of the teachers in this study agreed that there were obstacles to implementing UDL in their classes. A lack of smart devices in the schools was one of the most frequently cited obstacles. Additionally, classes were not well prepared for UDL in terms of resources, technology, or staff numbers.

References:

Abdou, E. and Saleh, A. (2019). The Effect of a Training Program Based on Playing on Alleviating the Behavioral Disorders among the Educable Intellectually Disabled Students in the Kingdom of Saudi Arabia. *Journal of Social Work Education and Practice*, *4*(1), 26–48. Retrieved from https://www.jswep.in/uploads/3/1/7/2/31729069/040103_the_effect_of_a_training_program_based_on_playing.pdf.

Afeafe, M. Y. (2013). *Special education in Saudi Arabia*. Retrieved from http://www.khayma.com/education-technology/PrvEducation3.htm.

Agbenyega, J. (2007). Examining teachers' concerns and attitudes to inclusive education in Ghana. *International Journal of Whole Schooling*, *3*(1), 41-56.

Ahmmed, M., Sharma, U. and Deppeler, J. (2012). Variables affecting teachers' attitudes towards inclusive education in Bangladesh. *Journal of Research in Special Educational Needs*, *12*(3), 132-140.

Ahsan, T. and Sharma, U. (2018). Pre-service teachers' attitudes towards inclusion of students with high support needs in regular classrooms in Bangladesh. *British Journal of Special Education*, *45*(1), 81-97.

AImousa, N. (2008). *The march of special education in the Kingdom of Saudi Arabia from isolation to integration*. Dubai: Dar AlQalam Publishers.

AImousa, N. (2010). *Saudi Arabia's experience in integrating students with special educational needs (success story)*. Riyadh: Arab Bureau of Education for the Gulf States.

Ainscow, M. (2014). *Education for All: Making It Happen*. Keynote address presented at the International Special Education Congress, Birmingham, UK, 10-13 April 2014.

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological bulletin,* 84(5), 888.

Alaisqih, S. (2002). *The effectiveness of cognitive behavioural programmes to modify the attitudes of girl students towards girl students with intellectual disabilities in mainstream schools*. MA. King Saud University.

Alanazi, M. (2012). *Teachers' and parents' attitudes towards inclusion in inclusive schools in Saudi Arabia.* PhD. University of Warwick.

Alanazi, M. S. (2015). The effectiveness of programmed education in developing writing skills of children with learning difficulties in primary education: A case study of northern border areas of Saudi Arabia. *Journal of Educational and Developmental Psychology*, *5*(2), 39.

Al-Aoufi, H., Al-Zyoud, N. and Shahminan, N. (2012). Islam and the cultural conceptualisation of disability. *International Journal of Adolescence and Youth*, *17*(4), 205-219.

Alasmrai, M. (2016, June). *The Religious, Social, and Cultural Constraints on Adult Education Research and Practices in Saudi Arabia*. Paper presented at the Adult Education Research Conference (AERC). Charlotte, NC.

Al-Azawei, A., Serenelli, F. and Lundqvist, K. (2016). Universal Design for Learning (UDL): a content analysis of peer reviewed journals from 2012 to 2015. *Journal of the Scholarship of Teaching and Learning*, *16*(3), 39-56.

Alberta Education. (2015, Jan 30). *Making Sense of Universal Design for Learning*. https://www.youtube.com/watch?v=MOUdmzaZrc8.

Albuhairi, S. S. A. (2015). *Preliminary factors necessary for effective implementation of cooperative learning, and their prevalence in cooperative learning practice in Saudi Arabia.* Doctoral dissertation, University of Hull.

Alcalde, C., Navarro, J. I., Marchena, E. and Ruiz, G. (1998). Acquisition of basic concepts by children with intellectual disabilities using a computer-assisted learning approach. *Psychological reports*, *82*(3), 1051-1056.

Aldabas, R. A. (2015). Special education in Saudi Arabia: History and areas for reform. *Creative Education*, *06*(11), 1158–1167. https://doi.org/10.4236/ce.2015.611114.

Alexander, R., Devapriam, J., Michael, D., McCarthy, J., Chester, V., Rai, R., ... and Roy, A. (2015). "Why can't they be in the community?" A policy and practice analysis of transforming care for offenders with intellectual disability. *Advances in Mental Health and Intellectual Disabilities*, *9*(3), 139-148.

Al-Faiz, H. (2016). *Attitudes of elementary school teachers in Riyadh, Saudi Arabia toward the inclusion of children with autism in public education*. University of Arkansas. ProQuest Dissertations and Theses, 118. Retrieved from http://search.proquest.com/docview/305356654?accountid=44936. (305356654).

Al-Fazul. (2015). *Inclusion education programs in Riyadh*. Retrieved from http://dr-banderalotaibi.com/end/drbander/admin/uploads/2/doc17-5.pdf.

Alfleaj, A. (2001). *Regulatory rules for institutes and special education programs*. Ministry of Education, the Municipality of Special Education. http://www.moe.gov.sa/se. 25/10/2016.

Alhammad, M. (2017). *The issues of implementing inclusion for students with Learning Difficulties in mainstream primary schools in Saudi Arabia*. Doctoral dissertation, University of Lincoln.

Alharbi, A. and Madhesh, A. (2018). Inclusive education and policy in Saudi Arabia. *International Journal of Education Research and Reviews*, *6*(1), 946–956. Retrieved from http://www.internationalscholarsjournals.org/download.php?id=285094428401152048.pdf&type=application/pdf&op=1.

Alhasan, N. A. (2018). Developing and Evaluating Peer Tutoring Programme (Maths PALS) for Trainee Teachers of SEN Pupils in Saudi Arabia.

Alhudaithi, G. S. S. (2015). *Saudi Arabian female teachers' attitudes towards the inclusion of children with autism into mainstream classrooms.* Doctoral dissertation, University of Leeds.

Alhusayn, H. (2004). *The problem of integration of students with mental retardation in primary schools in Saudi Arabia*. MA. Gulf University

Ali, S. (2012). Teaching reading and spelling to adult learners: The Multisensory Structured Language Approach. *English Language Teaching, 5*(3), 40-45.

Alibrahim, N. (2003). *Problems facing mainstream school head teachers that have hearing impairment programmes in the Ministry of Education*. MA. King Saud University.

Alkahtani, K. D. F. (2013). Teachers' knowledge and use of assistive technology for students with special educational needs. *Journal of Studies in Education*, *3*(2), 65-79.

Al-Kahtani, M. A. (2015). The Individual Education Plan (IEP) Process for Students with Intellectual Disabilities in Saudi Arabia: Challenges and Solutions.

ALKhashrami, S. (2003). *Development of Special Education in the Kingdom of Saudi Arabia*. Paper presented at the Saudi Cultural week in Jordan. Amman.

Al-khashrami. (2015). *The effects on inclusion on language development and adaptive behaviours for students with mental retardation*. Retrieved from http://dr banderalotaibi.com/end/drbander/admin/uploads/2/4.pdf.

Alkhateeb, J. M., Hadidi, M. S. and Alkhateeb, A. J. (2016). Inclusion of children with developmental disabilities in Arab countries: A review of the research literature from 1990 to 2014. *Research in developmental disabilities*, *49*, 60-75.

Allison, R. B. (2012). The lived experiences of general and special education teachers in inclusion classrooms: A phenomenological study. *Canyon Journal of Interdisciplinary Studies*, *1*(1) 36-47.

Almasoud, S. A. A. (2017). *Female Saudi Arabian Students' Attitudes, Willingness and Preferences of Communication in Online Educational Settings.* Doctoral dissertation.

Al-Mousa, N. A. (2010). *The experience of the kingdom of Saudi Arabia in mainstreaming students with special educational needs in public schools*. UNESCO Office Beirut and Regional Bureau for Education in the Arab States. Retrieved from http://unesco.atlasproject.eu/unesco/details/en/details.html?ci=797d5a0a-6b65-40f9-a0e0-c454f2d9749f.

Alnahdi, G. (2014). Special education teacher transition-related competencies and preparation in Saudi Arabia. *International Journal of Special Education*, *29*(2), 59–67. Retrieved from https://files.eric.ed.gov/fulltext/EJ1029006.pdf.

Alnahdi, G. (2016). Best Practices in the Transition to Work Services for Students with Intellectual Disability: Perspectives by Gender from Saudi Arabia. *International Journal of Special Education*, *31*(3), n3.

Alnahdi, G. H. (2015). Teaching Reading for Students with Cognitive disability Disabilities: A Systematic Review. *International Education Studies*, *8*(9), 79.

Alnahdi, G. H., Saloviita, T. and Elhadi, A. (2019). Inclusive education in Saudi Arabia and Finland: pre-service teachers' attitudes. *Support for Learning*, *34*(1), 71-85.

Alotaibi, A. (2011). *The reality of the application of the general education curriculum for deaf students at primary school from the perspectives of teachers and parents.* MA. King Saud University.

Alothman, A. (2014). *Inclusive education for deaf students in Saudi Arabia: Perceptions of school's principals, teachers and parents*. Doctoral dissertation, University of Lincoln.

Al-Oweidi, A. (2015). Evaluation of Vocational Services Provided to Jordanian Disabled People According to International Standers. *International Education Studies*, *8*(3), 77.

Alquraini, T. (2015). The nature of the perspective of general and special education teachers on the concept of access to the general curriculum for students with intellectual disabilities and classroom variables affecting it. *Journal of Educational and Psychological Sciences*, *16*(4) 214-272.

Alquraini, T. A. (2011). *Teachers' perspectives of inclusion of the students with severe disabilities in elementary schools in Saudi Arabia*. Doctoral dissertation, Ohio University.

Alquraini, T. A. (2012). Factors related to teachers' attitudes towards the inclusive education of students with severe intellectual disabilities in Riyadh, Saudi. *Journal of Research in Special Educational Needs*, *12*(3), 170-182.

Alquraini, T. A. S. and Rao, S. M. (2018a). A Study Examining the Extent of Including Competencies of Inclusive Education in the Preparation of Special Education Teachers in Saudi Universities. *International Journal of Disability, Development and Education*, *65*(1), 108-122.

Alquraini, T. and Rao, S. (2018b). Assessing teachers' knowledge, readiness, and needs to implement Universal Design for Learning in classrooms in Saudi Arabia. *International Journal of Inclusive Education*, 1-12. http://dx.doi.org/10.1080/13603116.2018.1452298 .

Alrusaiyes, R. F. (2014). *Perspectives toward transition program for females with intellectual disability in the Kingdom of Saudi Arabia*. University of Northern Colorado.

Al-Sadan, I. (2000). Educational assessment in Saudi Arabian schools. *Assessment in Education: Principles, Policy and Practice*, *7*(1), 143-155.

Alsalem, A. S. (2015a). *Using Critical Theory Approaches to Improve Reflective Writing, Social Consciousness, and Social Engagement of 10th Grade Female Students in Saudi Arabia: A Mixed Methods Study*. Southern Illinois University Carbondale.

Alsalem, M. (2015b). *Considering and supporting the implementation of universal design for learning among teachers of students who are deaf and hard of hearing in Saudi Arabia.* Doctoral dissertation, University of Kansas.

Alshahrani, M. M. (2014). *Saudi Educators' Attitudes towards Deaf and Hard of Hearing Inclusive Education in Jeddah, Saudi Arabia.* Published Ph.D. Thesis, University of Exeter. https://doi.org/K/35/20187.

ALShamare, A. H. (2019). *Investigating the Role of Social Media in Supporting Parents and Teachers of Students with Down's Syndrome: Focus on Early Intervention Services in the Kingdom of Saudi Arabia*. Doctoral dissertation, UCL (University College London).

Alshuwaikhat, H., Adenle, Y. and Saghir, B. (2016). Sustainability assessment of higher education institutions in Saudi Arabia. *Sustainability*, *8*(8), 750.

Al-Sughayr, A. M. and Ferwana, M. S. (2012). Prevalence of mental disorders among high school students in National Guard Housing, Riyadh, Saudi Arabia. *Journal of Family and Community Medicine*, *19*(1), 47.

Al-Zoubi, S. M. and Bani Abdel Rahman, M. S. (2016). Mainstreaming in Kingdom of Saudi Arabia: Obstacles facing learning disabilities resource room. *Journal of Studies in Education*, *6*(1), 37–55. https://doi.org/10.5296/jse.v6i1.8800.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. 5th edition. Washington, DC: American Psychiatric Association.

Amr, M. (2011). Teacher education for inclusive education in the Arab world: The case of Jordan. *Prospects*, *41*(3), 399-413.

Anderson, V. (2017). *The Importance of Teaching Social-Emotional Learning to Intellectually Disabled Students*. Trevecca Nazarene University.

Anderson-Inman, L. and Horney, M. A. (2007). Supported eText: Assistive technology through text transformations. *Reading Research Quarterly*, *42*(1), 153-160.

Arbeiter, S. and Hartley, S. (2002). Teachers' and pupils' experiences of integrated education in Uganda. *International Journal of Disability, Development and Education*, *49*(1), 61-78.

Armstrong, M., Morris, C., Abraham, C., Ukoumunne, O. C. and Tarrant, M. (2016). Children's contact with people with disabilities and their attitudes towards disability: a cross-sectional study. *Disability and rehabilitation*, *38*(9), 879-888.

Armstrong, T. (2012). *Neurodiversity in the classroom: Strength-based strategies to help students with special needs succeed in school and life*. ASCD.

Arreguín-Anderson, M. G., Torres, R. and Ruiz-Escalante, J. A. (2011). Critical dialogue: Perspectives and Practices of Three bilingual Elementary Science Teachers. *Journal of Border Educational Research*, *10*, 70–83.

Aseery, F. (2016). Teachers' attitudes toward the inclusion of deaf and hard of hearing students in regular education classrooms in Saudi Arabia.

Ashman, A. and Elkins, J. (2011). *Education for inclusion and diversity*. 4th ed. Frenchs Forest, Australia: Pearson.

Assor, A. and Kaplan, H. (2001). Mapping the domain of autonomy support. In *Trends and prospects in motivation research* (101-120). Springer, Dordrecht.

Astley, W. G. (1985). Organizational size and bureaucratic structure. *Organization Studies*, *6*(3), 201-228.

Avramidis, E. and Kalyva, E. (2007). The influence of teaching experience and professional development on Greek teachers' attitudes towards inclusion. *European Journal of Special Needs Education*, *22*(4), 367-389.

Avramidis, E. and Norwich, B. (2002) Teachers' attitudes towards integration/inclusion: A review of the literature. *European Journal of Special Needs Education*, 17(2) 129-147.

Ballard, K. (2018). Inclusion, paradigms, power and participation. In *Towards inclusive schools?* (1-14). Routledge.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191.

Barrio, B. and Hollingshead, A. (2017). Reaching Out to Paraprofessionals: Engaging Professional Development Aligned With Universal Design for Learning Framework in Rural Communities. *Rural Special Education Quarterly*, *36*(3), 136-145. http://dx.doi.org/10.1177/8756870517721693.

Barton, L. (2003). Inclusive education and teacher education. Institute of Education, *University of London.*

Basham, J. D., Israel, M., Graden, J., Poth, R. and Winston, M. (2010). A comprehensive approach to RTI: Embedding universal design for learning and technology. *Learning Disability Quarterly, 33*(4), 243-255.

Bates, T. (2014). *Dialogue and discussion: critical for 21st century skills development*. Retrieved from https://www.tonybates.ca/2014/08/03/dialogue-and-discussion-critical-for-21st-century-skills-development/.

Battal, Z. M. (2016). Special Education in Saudi Arabia. *International Journal of Technology and Inclusive Education*, *5*(2) (IJTIE), Volume 5, Issue 2, June 2016, 880–886. https://doi.org/10.20533/ijtie.2047.0533.2016.0113.

Bebetsos, E., Zafeiriadis, S., Derri, V. and Kyrgiridis, P. (2013). Relationship among students' attitudes, intentions and behaviors towards the inclusion of peers with disabilities, in mainstream physical education classes. *International Electronic Journal of Elementary Education*, *5*(3), 233-248.

Beirnes-Smith et al. (2006) point out that the term 'intellectual disabilities' is used internationally and Mansell (2010) states that 'intellectual disabilities' refers to learning difficulties in the context of the UK.

Belmont, M., Skinner, E., Wellborn, J., Connell, J. and Pierson, L. (1992). *Teacher as social context (TASC): Two measures of teacher provision of involvement, structure, and autonomy support*. Unpublished manuscript, Graduate School of Education and Human Development, Department of Psychology, University of Rochester.

Bender, R. (2013). *The Conquest of Deafness*. Cleveland: Western Reserve University.

Benton-Borghi, B. H. (2016). Universal design for learning (UDL) infused technological pedagogical content knowledge (TPACK) model prepares efficacious 21st-century teachers. *Handbook of technological pedagogical content knowledge (TPACK) for educators*, *143*.

BERA. (2012). *ETHICAL GUIDELINES FOR EDUCATIONAL RESEARCH*. On-line resource. https://www.bera.ac.uk/wp-content/uploads/2014/02/BERA-Ethical-Guidelines-2011.pdf.

Beyer, S., Meek, A. and Davies, A. (2016). Supported work experience and its impact on young people with intellectual disabilities, their families and employers. *Advances in Mental Health and Intellectual Disabilities*, *10*(3), 207-220.

Biawzir, R. (2010) Training needs for art education teachers for the education of students with intellectual disabilities who are able to learn in integration programs. MA. King Saud University.

Billingsley, S. B. and McLesky, J. (2004). Critical Issues in Special Education, Teacher Supply and Demand: Overview. *The Journal of Special Education*, *38*(1), 2-4.

Blackorby, J., & Wagner, M. (1996). Longitudinal postschool outcomes of youth with disabilities: Findings from the National Longitudinal Transition Study. *Exceptional children*, 62(5), 399-413.

Blumer, H. (1977). Comment on Lewis' "The Classic American Pragmatists as Forerunners to Symbolic Interactionism". *The Sociological Quarterly*, *18*(2), 285-289.

Bogdan, R. and Biklen, D. (2013). Handicapism. In *Foundations of Disability Studies* (1-16). Palgrave Macmillan, New York.

Booth, T. (2013). Inclusion and exclusion in the city: concepts and contexts. In *Inclusion in the city* (11-25). Routledge.

Booth, T. and Ainscow, M. (1998). *From them to us: An international study of inclusion in education*. London: Routledge.

Booth, T. and Ainscow, M. (2011) *Index for inclusion. Developing learning and participation in schools*. Bristol: Centre for Studies on Inclusive Education.

Bouck, E. C., Doughty, T. T., Flanagan, S. M., Szwed, K. and Bassette, L. (2010). Is the pen mightier? Using pentop computers to improve secondary students' writing. *Journal of Special Education Technology*, *25*(4), 33-47.

Boyle, C., Topping, K. and Jindal-Snape, D. (2013). Teachers' attitudes towards inclusion in high schools. *Teachers and Teaching, 19*(5), 527-542.

Boyle, J. T. and Nicol, D. J. (2003). Using classroom communication systems to support interaction and discussion in large class settings. *Alt-J*, *11*(3), 43–57. doi: 10.1080/0968776030110305

Brace, I. (2008). *Questionnaire Design: How to Plan, Structure and Write Survey Material for Effective Market resear*ch. Kogan Page Publishers.

Brady, K. and Woolfson, L. (2008). What teacher factors influence their attributions for children's difficulties in learning? *British Journal of Educational Psychology*, *78*(4), 527-544.

Brannen, J. (2005). Mixing methods: the entry of qualitative and quantitative approaches into the research process. *International Journal of Social Research*

Bray, M., Clarke, P .B. and Stephens, D. (2016). *Education and Society in Africa*. London: Edward Arnold.

Brinker, R. P. and Thorpe, M. E. (1984). Integration of severely handicapped students and the proportion of IEP objectives achieved. *Exceptional Children*, *51*(2), 168-75.

Brock, M. E., Biggs, E. E., Carter, E. W., Cattey, G. N. and Raley, K. S. (2016). Implementation and generalization of peer support arrangements for students with severe disabilities in inclusive classrooms. *The Journal of Special Education*, *49*(4), 221-232.

Brooks, L. (1997). Structuration theory and new technology: Analysing organizationally situated computer-aided design (CAD*). Information Systems Journal, 7*(2), 133-151.

Brown, G. D. and Watson, F. L. (1987). First in, first out: Word learning age and spoken word frequency as predictors of word familiarity and word naming latency. *Memory & Cognition*, *15*(3), 208-216.

Brucker, D. L., Botticello, A., O'Neill, J. and Kutlik, A. (2017). Variations in social capital among vocational rehabilitation applicants. *Journal of Vocational Rehabilitation*, *46*(2), 187-194.

Brug, J., van Stralen, M. M., te Velde, S. J., Chinapaw, M. J., De Bourdeaudhuij, I., Lien, N., ... and Moreno, L. (2012). Differences in weight status and energy-balance related behaviors among schoolchildren across Europe: the ENERGY-project. *PloS one*, *7*(4), e34742.

Bryans Bongey, S., Cizadlo, G. and Kalnbach, L. (2010). Blended solutions: Using a supplemental online course site to deliver universal design for learning (UDL). *Campus-Wide Information Systems*, *27*(1), 4-16.

Bryant, B. and Bryant, D. (2015). Introduction to the Special Series on Universal Design for Learning. *Learning Disability Quarterly*, *38*(2), 71-71. http://dx.doi.org/10.1177/0731948714565906.

Bryman, Alan. "Integrating quantitative and qualitative research: how is it done?." *Qualitative research* 6, no. 1 (2006): 97-113.

Bryman, A. (2015). *Social Research Methods*. Oxford University Press. 2016. https://books.google.com.sa/books?hl=en&lr=&id=N2zQCgAAQBAJ&oi=fnd&pg=PP1&dq=Bryman,+A.+(2015).+Social+Research+Methods.+Oxford+University+Press.&ots=doPrKYL6wd&sig=4opsPIyR1rK-bYQ874T79eEdBKI&redir_esc=y#v=onepage&q=Bryman%2C%20A.%20(2015).%20Social%20Research%20Methods.%20Oxford%20University%20Press.&f=false.

Bryman, A., & Bell, E. (2003). Breaking down the quantitative/qualitative divide. Business Research Methods, 2(1), 465-478.

Bulmer, M. (2004). Sage Benchmarks in Social Science Research Methods. *Questionnaires, 1st edition edited by: Bulmer,* M., Sage Publications, London, 354.

Burgstahler, S. (2003). The role of technology in preparing youth with disabilities for postsecondary education and employment. *Journal of Special Education Technology*, *18*(4), 7-19.

Burrell, G. and Morgan, G. (1979). Two dimensions: Four paradigms. *Sociological paradigms and organizational analysis*, 21-37.

Cargan, L. (2007). *Doing Social Research*. Rowman and Littlefield. Rowman and littlefield publishers,INC.Lanham, Boulder,New York,Toronto,Plymouth, UK.

Carlson, N. R. and Buskist, W. (1997). *Stress and Health. Psychology the Science of Behavior.* USA: Allyn and Bacon.

Carmen, R. (2016). *Autonomous Development: Humanizing the Landscape - An Excursion into Radical Thinking and Practice*. London: Zed Books.

Carter, B. B. and Spencer, V. G. (2006). The fear factor: Bullying and students with disabilities. *International Journal of Special Education*, *21*(1), 11-23.

Carter, E. W. (2018). Supporting the social lives of secondary students with severe disabilities: Considerations for effective intervention. *Journal of Emotional and Behavioral Disorders*, *26*(1), 52-61.

Carter, E. W., Brock, M. E. and Trainor, A. A. (2014). Transition assessment and planning for youth with severe intellectual and developmental disabilities. *The Journal of Special Education*, *47*(4), 245-255.

CAST. (2011). *Universal Design for Learning Guidelines version 2.0*. Wakefield, MA: Author.

CAST. (2015). *Universal design for learning (UDL) is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn*.

http://www.cast.org/our-work/about-udl.html?utm_source=udlguidelines&utm_medium=web&utm_campaign=none&utm_content=homepage#.XRqXb-jXJPY

CAST. (2016). *Universal Design for Learning Guidelines 1.0*. Wakefield, MA: CAST.

CAST. (2018). *Universal Design for Learning Guidelines version 2.2*. Retrieved from http://udlguidelines.cast.org.

Cengel, M. and Alkan, A. (2018). *Problems Faced by Teachers of Gifted/Talented Students*. Online Submission.

Centre for Training Enhancements. (2015). *Centre for Enhancement of Learning & Teaching (CELT).* https://www.itsligo.ie/about-it-sligo/administration/registrar/celt/. 3/5/2016

Chao, A., Jost, L., Hsieh, T. C., Ma, K. H., Sherwin, W. B. and Rollins, L. A. (2015). Expected Shannon entropy and Shannon differentiation between subpopulations for neutral genes under the finite island model. *PloS one*, *10*(6), e0125471.

Chazan, M. (1994). The attitudes of mainstream teachers towards pupils with emotional and behavioural difficulties. *European Journal of Special Needs Education*, *9*(3), 261-274.

Chen, T. W. (2014). *The effects of training in universal design for learning*. University of Minnesota, 1-76.

Chen, Y. L. (2009). Mixed-methods study of EFL teachers' Internet use in language instructions. *Teaching and Teachers Educations*, *24*(4), 1015-1028.

Chhabra, S., Srivastava, R. and Srivastava, I. (2010). Inclusive education in Botswana: The perceptions of school teachers. *Journal of Disability Policy Studies*, *20*(4), 219-228.

Chiner, E. and Cardona, M. C. (2013). Inclusive education in Spain: how do skills, resources, and supports affect regular education teachers' perceptions of inclusion? *International Journal of Inclusive Education*, *17*(5), 526-541.

Clea McNeely, J. B. (2010). *The Teen Years Explained: Aguide to Healthy Adolescent Development*. Center for Adolescent Health at Johns Hopkins Bloomberg School of Public Health.

Cohen, L., Manion, L. and Morrison, K. (2007) *Research methods in education*. London: Routledge.

Cohen, L., Manion, L. and Morrison, K. (2013). *Research methods in education*. Routledge.

Cole, C. M., Waldron, N. and Majd, M. (2004). Academic progress of students across inclusive and traditional settings. *Mental retardation*, *42*(2), 136-144.

Cole, D. A., & Meyer, L. H. (1991). Social integration and severe disabilities: A longitudinal analysis of child outcomes. *The Journal of Special Education*, 25(3), 340-351.

Collins, T. (1990). The impact of microcomputer word processing on the performance of learning-disabled students in a required first-year writing course. *Computers and Composition*, 8(1), 49-67.

Collis, J. and Hussey, R. (2009). *Business research: a practical guide for undergraduate and postgraduate students*. 3rd edition. Basingstoke: Palgrave Macmillan.

Committee on Undergraduate Science Education. (2000). *Science teaching reconsidered: a handbook*. Washington: National Academy Press.

Conkbayir, M. and Pascal, C. (2014). *Early childhood theories and contemporary issues: An introduction*. UK: Bloomsbury Publishing.

Conner, M. and Abraham, C. (2001). Conscientiousness and the theory of planned behavior: Toward a more complete model of the antecedents of intentions and behavior. *Personality and Social Psychology Bulletin, 27*(11), 1547-1561.

Cook, B. G., Tankersley, M., Cook, L. and Landrum, T. J. (2000). Teachers attitudes toward their included students with disabilities. *Exceptional children*, *67*(1), 115-135.

Cook, G. (2001). *The discourse of advertising*. 2nd edition. Psychology Press. Routledge Taylor and Francis Group London and New York.

Cook, S. C. and Rao, K. (2018). Systematically applying UDL to effective practices for students with learning disabilities. *Learning Disability Quarterly*, *41*(3), 179-191.

Coolican, H. (2017). *Research methods and statistics in psychology*. Psychology Press.

Copeland, R. A. (2004). *Enzymes: a practical introduction to structure, mechanism, and data analysis*. John Wiley and Sons.

Council for Exceptional Children. (2005). *Universal design for learning: A guide for teachers and education professionals.* Upper Saddle River, N.J: Pearson/Merrill Prentice Hall.

Courey, S. J., Tappe, P., Siker, J. and LePage, P. (2013). Improved lesson planning with universal design for learning (UDL). *Teacher education and special education*, *36*(1), 7-27.

Coyne, P., Pisha, B., Dalton, B., Zeph, L. A. and Smith, N. C. (2012). Literacy by design: A universal design for learning approach for students with significant intellectual disabilities. *Remedial and Special Education*, *33*(3), 162-172.

Crabtree, Ashencaen, S. and Williams, R. (2010). Inclusive Education and Children with Disabilities in the Gulf Cooperation Council Member States. In: A. E. Mazawi and R. Sultana *(eds.) Education and the Arab 'world': political projects, struggles, and geometries of power.* New York: Routledge, 196-213.

Creswell, J. W. (2009). *Research Design Qualitative, Quantitative and Mixed Methods Approaches*. Third edition. California: Sage.

Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. SAGE.

Creswell, J. W. (2014*). A concise introduction to mixed methods research*. Sage Publications.

Creswell, J. W. and Clark, V. L. P. (2007). *Designing and conducting mixed methods research*.

Creswell, J. W. and Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Creswell, J. W. and Plano Clark, V. L. (2011). Designing and conducting mixed methods research (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc. data combination and analysis. *Nursing Research*, *55*, 43-49.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. London: SAGE.

CSIE. (2018a). *Inclusive education in the UK – no discrimination on grounds of disability and special educational needs*. http://www.csie.org.uk/inclusion/education-disability.shtml. *Centre for Studies on Inclusive Education.* Saturday 27 October 2018.

CSIE. (2018b). *The UN Convention on the Rights of Persons with Disabilities*. http://www.csie.org.uk/inclusion/rights-persons-disabilities.shtml. Centre for Studies on Inclusive Education. Tuesday 23 October 2018.

Cullen, J., Richards, S. B. and Frank, C. L. (2008). Using software to enhance the writing skills of students with special needs. *Journal of Special Education Technology*, *23*(2), 33-44.

Cutler, D. M. (1990). *An aging society: Opportunity of challenge*. https://dspace.mit.edu/bitstream/handle/1721.1/63288/agingsocietyoppo00cutl.pdf?sequence=1.

Dalton, E. M., Mckenzie, J. A. and Kahonde, C. (2012). The implementation of inclusive education in South Africa: Reflections arising from a workshop for teachers and therapists to introduce Universal Design for Learning. *African Journal of Disability*, *1*(1).

David Howard Rose, A. M. (2002). *Teaching Every Student in the Digital Age: Universal Design for Learning*. Association for Supervision and Curriculum Development.

Davies, D. K., Stock, S. E. and Wehmeyer, M. L. (2002). Enhancing independent task performance for individuals with mental retardation through use of a handheld self-directed visual and audio prompting system. *Education and Training in Mental Retardation and Developmental Disabilities*, 209-218.

De Boer, A., Pijl, S. J. and Minnaert, A. (2011). Regular primary schoolteachers' attitudes towards inclusive education: A review of the literature. *International Journal of Inclusive Education*, *15*(3), 331-353.

De Jong, M. T. and Bus, A. G. (2004). The efficacy of electronic books in fostering kindergarten children's emergent story understanding. *Reading Research Quarterly*, *39*(4), 378-393.

De Leeuw, R., De Boer, A. and Minnaert, A. (2018). Bridging the gap between theory and practice: identifying what primary teachers do to facilitate the social participation of students with SEBD in the inclusive classroom. *European Journal of Special Needs Education*, 1-15.

Dean, E. E., Shogren, K. A., Hagiwara, M. and Wehmeyer, M. L. (2018). How does employment influence health outcomes? A systematic review of the intellectual disability literature. *Journal of Vocational Rehabilitation*, *49*(1), 1-13.

Dean, T., Lee-Post, A. and Hapke, H. (2016). Universal Design for Learning in Teaching Large Lecture Classes. *Journal Of Marketing Education*, *39*(1), 5-16. http://dx.doi.org/10.1177/0273475316662104.

Deng, M. (2008). The Attitudes of Primary School Teachers toward Inclusive Education in Rural and Urban China. *Journal of Frontiers of Education in China*, *Vol.3*, No.4, 73-492.

Department of Health. (2001). *Valuing people: a new strategy for learning disability for the 21st century*. CM5086. London: The Stationery Office. Available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/250877/5086.pdf [Accessed 14 April 2014].

Dillon, J. and Wals, A. E. (2016). On the dangers of blurring methods, methodologies and ideologies in environmental education research. In *Towards a Convergence Between Science and Environmental Education* (113-124). Routledge.

Dimitrov, D. M. and Alsadaawi, A. (2018). Latent profiles of performance on certification testing: The case of special education teachers in Saudi Arabia. *Universal Journal of Educational Research*, *6*(9), 2029-2035.

Donaldson, L. (2009). 4a Position Statement for Positivism. *Debating organization: Point-counterpoint in organization studies*, 116.

Dovey, K. A. (2014). Non-formal educational strategies as a means of effecting positive change in instructions of formal education in South Africa. *Journal of Practice in Education and Development*, *Vol.1*, No.1, 15-20.

Downing, J. E., Morrison, A. P. and Berecin-Rascon, M. A. (1996). Including elementary school students with autism and intellectual impairments in their typical classrooms: Process and outcomes. *Developmental Disabilities Bulletin*, *24*, 20-45.

Downing, J. E., Spencer, S. and Cavallaro, C. (2004). The development of an inclusive charter elementary school: Lessons learned. *Research and practice for persons with severe disabilities, 29*(1), 11-24.

Dunning, H., Williams, A., Abonyi, S. and Crooks, V. (2008). A mixed method approach to quality of life research: a case study approach. *Social Indicators Research*, *85*, 145-158.

Dweck, C. S., Walton, G. M. and Cohen, G. L. (2014). *Academic tenacity: Mindsets and skills that promote long-term learning*. Bill and Melinda Gates Foundation.

Dykens, E. M., Shah, B., Davis, B., Baker, C., Fife, T. and Fitzpatrick, J. (2015). Psychiatric disorders in adolescents and young adults with Down syndrome and other intellectual disabilities. *Journal of Neurodevelopmental Disorders*, *7*(1). https://doi.org/10.1186/s11689-015-9101-1.

Dyson, A. (1997). Social and educational disadvantage: Reconnecting special needs education. *British Journal of Special Education, 24*(4) 152-157.

Eather, N., Riley, N., Miller, D. and Jones, B. (2017). Evaluating the Effectiveness of Using Peer-Dialogue Assessment (PDA) for Improving Pre-Service Teachers Perceived Confidence and Competence to Teach Physical Education. *Australian Journal of Teacher Education*, *42*(1), 69–83. doi: 10.14221/ajte.2017v42n1.5

Elkins, J., Van Kraayenoord, C. E. and Jobling, A. (2003). Parents' attitudes to inclusion of their children with special needs. *Journal of Research in Special Educational Needs*, *3*(2), 122-129.

Ellis, S., Tod, J. and Graham-Matheson, L. (2008). *Special educational needs and inclusion: Reflection and renewal*. Birmingham: National Association of Schoolmasters Union of Women Teachers.

Ellis-Robinson, T. (2015). *The effect of poetry as a write to learn activity on content acquisition, content area writing proficiency, and classroom engagement in an inclusive middle school social studies setting: A mixed methods study*. State University of New York at Albany.

Embry, P. B. and McGuire, J. M. (2011). Graduat teaching assistant in the learning paradigm: Beliefs about inclusive teaching. *Journal on Excellence in College Teaching, 22*(2), 85-108.

England, L. (2012). *Online language teacher education: TESOL perspectives*. New York: Routledge.

Evans, E., Burritt, R. and Guthrie, J. (Eds.). (2010). *Accounting Education at a Crossroad in 2010*. Institute of Chartered Accountants in Australia.

Ewing, D. L., Monsen, J. J. and Kwoka, M. (2014). Behavioural and emotional well-being of children following non-directive play with school staff. *Educational Psychology in Practice*, *30*(2), 192-203.

Fakolade, O. A., Adeniyi, S. O. and Tella, A. (2017). Attitude of teachers towards the inclusion of special needs children in general education classroom: The case of teachers in some selected schools in Nigeria. *International Electronic Journal of elementary education*, *1*(3), 155-169.

Fakolade, O.A., Adeniyi, S.O. and Tella, A. (2009) Attitude of teachers toward the inclusion of children with special needs in the general education classroom: The case of teachers in some selected schools in Nigeria*. International Electronic Journal of Elementary Education*, 3(1) 155169.

Fey, M. E., Warren, S. F., Brady, N., Finestack, L. H., Bredin-Oja, S. L., Fairchild, M., ... & Yoder, P. J. (2006). Early effects of responsivity education/prelinguistic milieu teaching for children with developmental delays and their parents. Journal of Speech, Language, and Hearing Research.

Field, A. (2017). Discovering statistics using IBM SPSS statistics: *North American edition*. Sage.

Fisher, D., Sax, C. and Grove, K. A. (2000). The resilience of changes promoting inclusiveness in an urban elementary school. *The Elementary School Journal*, *100*(3), 213-227.

Fiske, S. T. and Taylor, S. E. (2013). *Social cognition: From brains to culture*. Second edition. Sage. https://books.google.co.uk/books?hl=ar&lr=&id=uVJdBAAAQBAJ&oi=fnd&pg=PP1&dq=Fiske+and+Taylor,+2013&ots=2fk2M-VQ2V&sig=3tApTCOiApFvX91H4-tCPfpE5Pw&redir_esc=y#v=onepage&q=Fiske%20and%20Taylor%2C%202013&f=false.

Flexer, R. W., Baer, R. M., Luft, P. J. and Simmons, T. J. (2012). *Transition planning for secondary students with disabilities.*

Flick, U. (2013). *The SAGE Handbook of Qualitative Data Analysis*. SAGE.

Flippo, R. F. and Caverly, D. C. (2000). *Handbook of college reading and study strategy research*. Mahwah, N.J: Lawrence Erlbaum Associates.

Florian, L. (Ed.). (2013). *The SAGE handbook of special education: Two volume set*. Sage.

Foreman, P., Arthur-Kelly, M., Pascoe, S. and King, B. S. (2004). Evaluating the educational experiences of students with profound and multiple disabilities in inclusive and segregated classroom settings: An Australian perspective. *Research and Practice for Persons with Severe Disabilities*, *29*(3), 183-193.

Fridh, M., Köhler, M., Modén, B., Lindström, M. and Rosvall, M. (2018). Subjective health complaints and exposure to peer victimization among disabled and non-disabled adolescents: A population-based study in Sweden. *Scandinavian journal of public health*, *46*(2), 262-271.

Friend, M. and Bursack, W. D. (2006). *Including students with special needs: A practical guide for classroom teachers.* 4th edition. Boston: Allyn & Bacon.

Fryxell, D. and Kennedy, C. H. (1995). Placement along the continuum of services and its impact on students' social relationships. *Journal of the Association for Persons with Severe Handicaps*, *20*(4), 259-269.

Furnham, A. and Heaven, P. (1999). *Personality and social behaviour. Arnold*. https://psycnet.apa.org/record/1999-04075-000.

Gaad, E. and Khan, L. (2007) Primary mainstream teachers' attitudes towards inclusion of students with special educational needs in the private sector: A perspective from Dubai. International *Journal of Special Education*, *22*(2), 95-109.

Gal, E., Schreur, N. and Engel-Yeger, B. (2010). Inclusion of Children with Disabilities: Teachers' Attitudes and Requirements for Environmental Accommodations. *International Journal of Special Education, 25*(2), 89-99.

Garcia, E. (2016). The need to address non-cognitive skills in the education policy agenda. In *Non-cognitive skills and factors in educational attainment* (31-64). Brill Sense.

Gargiulo, R. M. (2012). *Special education in contemporary society: An introduction to exceptionality*. Los Angeles: SAGE Publications.

Gargiulo, R. M. and Metcalf, D. (2017). *Teaching in Today s Inclusive Classrooms: A Universal Design for Learning Approach*. Nelson Education.

Garguilo, R. M. and Metcalf, D. (2016). *Teaching in today's inclusive classrooms: A universal design for learning approach*. US: Cengage Learning.

Geary, D. C. (1994). *Children's mathematical development: Research and Practical Applications*. Washington, DC: American Psychological Association.

Germundsson, P., Hillborg, H. and Danermark, B. (2011). Interagency collaboration in vocational rehabilitation for persons with mental health problemms: the perspective of the service users and the professionals. *Disability and Society*, *26*(6), 699-713.

Gilakjani, A. P. (2012). Visual, auditory, kinaesthetic learning styles and their impacts on English language teaching. *Journal of Studies in Education, 2*(1), 104-110.

Göransson, K., Hellblom-Thibblin, T. and Axdorph, E. (2016). A conceptual approach to teaching mathematics to students with intellectual disability. *Scandinavian Journal of Educational Research*, *60*(2), 182-200.

Gray, D. E. (2006). Coping over time: The parents of children with autism. *Journal of Intellectual Disability Research*, *50*(12), 970-976.

Greenberg, S. A., Pinkus, J. L., Amato, A. A., Kristensen, T. and Dorfman, D. M. (2016). Association of inclusion body myositis with T cell large granular lymphocytic leukaemia. *Brain*, *139*(5), 1348-1360.

Gross, J. (2002). *Special educational needs in the primary school: A practical guide*. 3rd edition. Buckingham: Open University Press.

Guba, E. G. and Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In: N. Denzin and Y. *Lincoln (eds.) Handbook of qualitative research*. London: Sage Publications, 105-117.

Hadidi, M. S. and Al Khateeb, J. M. (2015). Special education in Arab countries: Current challenges. *International Journal of Disability, Development and Education*, *62*(5), 518-530.

Haimovitz, K. and Dweck, C. S. (2017). The origins of children's growth and fixed mindsets: New research and a new proposal. *Child Development*, *88*(6), 1849-1859.

Hakim, A. H. (2009). *Attitudes of teachers of primary and middle schools in Mecca towards the policy of integration in public schools (comparative study)*. Umm al-Qari University.

Haley-Mize, S. and Reeves, S. (2013). Universal design for learning and emergent-literacy development: Instructional practices for young learners. *Delta Kappa Gamma Bulletin*, *79*(2), 70.

Hall, G. E., & Hord, S. M. (1987). Change in schools: Facilitating the process. Suny Press.

Hall, G. E., George, A. A., & Rutherford, W. L. (1977). Measuring stages of concern about the innovation: A manual for use of the SoC questionnaire. Austin: The University of Texas at Austin. Research and Development Center for Teacher Education.

Hall, T. E., Cohen, N., Vue, G. and Ganley, P. (2015). Addressing learning disabilities with UDL and technology: Strategic reader. *Learning Disability Quarterly*, *38*(2), 72-83.

Hall, T. E., Meyer, A. and Rose, D. H. (Eds.). (2012). *Universal design for learning in the classroom: Practical applications*. Guilford Press.

Hall, T. E., Wolfe, P. S. and Bollig, A. A. (2003). The home-to-school notebook: An effective communication strategy for students with severe disabilities. *Teaching Exceptional Children*, *36*(2), 68-73.

Hamed, M. Zeadh, M. AlOtaibi, B. and Metwally, N. (2005). *Education in Saudi Arabia: Vision of the present and the future*. Riyadh. ALRushd bookstore.

Hammond, H. and Ingalls, L. (2003). Teachers' attitudes toward inclusion: Survey results from elementary school teachers in three southwestern rural school districts. *Rural Special Education Quarterly*, *22*(2), 24-30.

Hanushek, E. A., Schwerdt, G., Woessmann, L. and Zhang, L. (2017). General education, vocational education, and labor-market outcomes over the lifecycle. *Journal of Human Resources*, *52*(1), 48-87.

Happ, M. B., Dabbs, A. D., Tate, J., Hricik, A., & Erlen, J. (2006). Exemplars of mixed methods data combination and analysis. Nursing research, 55(2), S43-S49.Hardie, E. and Tilly, L. (2012). *An introduction to supporting people with a learning disability.* London: Learning Matters.

Harlen, W. (2007). *Assessment of learning*. Los Angeles, Calif: *Sage. First published 2007*.

Harris, J. C. (2006). *Intellectual Disability: Understanding its Development, Causes, Classification, Evaluation, and Treatment*. Oxford University Press, USA.

Hartley, M. T., Bauman, S., Nixon, C. L. and Davis, S. (2015). Comparative study of bullying victimization among students in general and special education. *Exceptional Children*, *81*(2), 176-193.

Hartmann, E. (2015). Universal Design for Learning (UDL) and Learners with Severe Support Needs. *International Journal of Whole Schooling*, *11*(1), 54-67.

Hassanein, E. E. A. (2015). Inclusion. In *Inclusion, Disability and Culture* (127-151). Sense Publishers, Rotterdam.

Hayes, A. M. and Bulat, J. (2017). *Disabilities Inclusive Education Systems and Policies Guide for Low- and Middle-Income Countries*. Occasional Paper. RTI Press Publication OP-0043-1707. RTI International.

Hebbeler, K. and Spiker, D. (2016). Supporting young children with disabilities. *The Future of Children*, *26*(2), 185-205.

Hegarty, S. and Alur, M. (Eds.). (2002). *Education & Children with Special Needs: From Segregation to Inclusion*. Sage.

Hehir, T. (2009). Policy foundations of universal design for learning. *A policy reader in universal design for learning*, 35-45.

Heward, W. L. and Silvestri, S. M. (2005). The neutralization of special education. *Controversial therapies for developmental disabilities: Fad, fashion, and science in professional practice,* 193-214.

Hilton, A. and Liberty, K. (1992). The challenge of ensuring educational gains for students with severe disabilities who are placed in more integrated settings. *Education and Training in Mental Retardation*, 167-175.

Hitchcock, C., Meyer, A., Rose, D. and Jackson, R. (2002). Providing new access to the general curriculum: Universal design for learning. *Teaching exceptional children*, *35*(2), 8-17.

Hodgetts, S. and Park, E. (2017). Preparing for the future: a review of tools and strategies to support autonomous goal setting for children and youth with autism spectrum disorders. *Disability and rehabilitation*, *39*(6), 535-543.

Hofman, R. H. and Kilimo, J. S. (2014). Teachers' attitudes and self-efficacy towards inclusion of pupils with disabilities in Tanzanian schools. *Journal of Education and Training*, *1*(2), 177-198.

Hollingshead, A. (2018). Designing Engaging Online Environments: Universal Design for Learning Principles. In *Cultivating diverse online classrooms through effective instructional design* (280-298). IGI Global.

Hong, B. S. (2015). Qualitative analysis of the barriers college students with disabilities experience in higher education. *Journal of College Student Development*, *56*(3), 209-226.

Hoppestad, B. S. (2013). Current perspective regarding adults with intellectual and developmental disabilities accessing computer technology. *Disability and Rehabilitation: Assistive Technology*, *8*(3), 190-194.

Hord, C. and Xin, Y. P. (2015). Teaching area and volume to students with mild intellectual disability. *The Journal of Special Education*, *49*(2), 118-128.

Hsieh, H. F. and Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative health research*, *15*(9), 1277-1288.

Huang, K. (2007). A multi-case study of inclusive schooling in Taipei: Its current status, barriers and supports, and the expected role of educational leaders. *Journal of Taiwan Normal University*, *52*(2) 95-113.

Hughes, J. A. and Sharrock, W. W. (2016). *The philosophy of social research*. London: Routledge.

Hunt, P., Soto, G., Maier, J. and Doering, K. (2003). Collaborative teaming to support students at risk and students with severe disabilities in general education classrooms. *Exceptional children*, *69*(3), 315-332.

Hunt, P., Staub, D., Alwell, M. and Goetz, L. (1994). Achievement by all students within the context of cooperative learning groups. *Journal of the Association for Persons with Severe Handicaps*, *19*(4), 290-301.

Hussain, O. (2010). *Evaluation of preparation program for teachers specializing in learning disabilities in Saudi Arabia.*

Hwang, Y. S. and Evans, D. (2011). Attitudes towards inclusion: Gaps between belief and practice. *International Journal of Special Education*, *26*(1), 136-146.

Individuals with Disabilities Education Act, IDEA. (2017). *Early intervention services*. Section 303.13. Retrieved from: https: //sites.ed. gov /idea /regs/c/a/303.13.

IRIS. (2015). *Universal Design for Learning: Creating a Learning Environment that Challenges and Engages All Students.* https://iris.peabody.vanderbilt.edu/module/udl/ .4/6/2015.

Ivankova, N. V., Creswell, J. W. and Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. *Field methods*, *18*(1), 3-20.

Izzo, M. and Bauer, W. (2013). Universal design for learning: enhancing achievement and employment of STEM students with disabilities. *Universal Access In The Information Society*, *14*(1), 17-27. http://dx.doi.org/10.1007/s10209-013-03321.

Izzo, M., Murray, A. and Center, N. (2013). Applying Universal Design for Learning principles to enhance achievement of college students. *Learning objects: Context and connections*, 29-42.

Jan, Y. E., Binjahlan, M. M., Alqurashi, A. G., Alqurashi, G. G., Zirari, M. A., Alturkistani, F. M., ... and Garah, R. K. (2017). Assessment of knowledge: Attitude and practice toward down syndrome in Jeddah City, Saudi Arabia 2016. *The Egyptian Journal of Hospital Medicine*, *31*(4075), 1-6.

Johnson, B. and Christensen, L. (2017). *Educational research: Quantitative, qualitative, and mixed approaches*. 6 edition.

Johnson, B., & Turner, L. A. (2003). Data collection strategies in mixed methods research. *Handbook of mixed methods in social and behavioral research*, 297-319.

Johnson, R. B., Onwuegbuzie, A. J., de Waal, C., Stefurak, T. and Hildebrand, D. (2016). *12 Unpacking Pragmatism for Mixed Methods Research*. The BERA/SAGE Handbook of Educational Research.

Johnson-Harris, K. M. and Mundschenk, N. A. (2014). Working effectively with students with BD in a general education classroom: the case for universal design for learning. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *87*(4), 168-174.

Johnston, L., Beard, L. A. and Carpenter, L. B. (2007). *Assistive technology: Access for all students.* Prentice Hall.

Kalyva, E., Gojkovic, D. and Tsakiris, V. (2007). Serbian teachers' attitudes towards inclusion. *International Journal of Special Education*, *22*(3). 31-36.

Kang, D. Y. and Martin, S. N. (2018). Improving learning opportunities for special education needs (SEN) students by engaging pre-service science teachers in an informal experiential learning course. *Asia Pacific Journal of Education*, *38*(3), 1–29. https://doi.org/10.1080/02188791.2018.1505599.

Karger, J. (2005). *Access to the general education curriculum for students with disabilities: a discussion of the interrelationship between IDEA04 and NCLB*. Wakefield, MA: National Center on Accessing the General Curriculum. RetrievedMay15,2007. http://www.cast.org/publications/ncac/ncac_discussion2004.html .

Karger, J. and Currie-Rubin, R. (2013). Addressing the Educational Needs of Incarcerated Youth. *Journal of Special Education Leadership*, *26*(2).

Katz, J. (2013). The three block model of universal design for learning (UDL): Engaging students in inclusive education. *Canadian Journal of Education*, *36*(1), 153.

Katz, J. (2014). *Teaching to diversity: The three-block model of universal design for learning*. Portage and Main Press.

Kauffman, J. M. and Hallahan, D. P. (1995). *The illusion of full inclusion: A comprehensive critique of a current special education bandwagon.* PRO-ED, Inc., 8700 Shoal Creek Blvd., Austin, TX 78757-6897.

Kaya, C., Chan, F., Rumrill, P., Hartman, E., Wehman, P., Iwanaga, K., ... and Avellone, L. (2016). Vocational rehabilitation services and competitive employment for transition-age youth with autism spectrum disorders. *Journal of Vocational Rehabilitation*, *45*(1), 73-83.

Kennedy, C. H., Shukla, S. and Fryxell, D. (1997). Comparing the effects of educational placement on the social relationships of intermediate school students with severe disabilities. *Exceptional Children*, *64*(1), 31-47.

Kennedy, M. J., Thomas, C. N., Meyer, J. P., Alves, K. D. and Lloyd, J. W. (2014). Using evidence-based multimedia to improve vocabulary performance of adolescents with LD: A UDL approach. *Learning Disability Quarterly*, *37*(2), 71-86.

Kesler, S. R., Sheau, K., Koovakkattu, D. and Reiss, A. L. (2011). Changes in frontal-parietal activation and math skills performance following adaptive number sense training: Preliminary results from a pilot study. *Neuropsychological rehabilitation*, *21*(4), 433-454.

Kiernan, W., Gilmore, D., Schalock, R., & Butterworth, J. (1997). National comparisons and critical findings in integrated employment. Integrated employment: Current status and future directions, 49-66.

King, F. (2012). *Developing and sustaining teachers' professional learning: a case study of collaborative professional development.* EdD. University of Lincoln.

King, L. H., Williams, J. B. and Warren, S. H. (2011). Preparing and supporting teachers for 21st century expectations through universal design for learning. *Delta Kappa Gamma Bulletin*, *77*(2), 51.

King-Sears, M. (2009). Universal design for learning: Technology and pedagogy. *Learning Disability Quarterly*, *32*(4), 199-201.

King-Sears, P. (2014). *Introduction to learning disability quarterly special series on universal design for learning: Part one of two*.

Klassen, R. M., Tze, V. M., Betts, S. M. and Gordon, K. A. (2011). Teacher efficacy research 1998–2009: Signs of progress or unfulfilled promise*? Educational psychology review*, *23*(1), 21-43.

Koomen, M., Kahn, S., Atchison, C. L. and Wild, T. A. (Eds.). (2018). *Towards inclusion of all learners through science teacher education*. BRILL.

Kortering, L. J., McClannon, T. W. and Braziel, P. M. (2008). Universal design for learning: A look at what algebra and biology students with and without high incidence conditions are saying. *Remedial and Special Education*, *29*(6), 352-363.

Kozub, F. M. and Lienert, C. (2003). Attitudes Toward Teaching Children With Disabilities: Review of Literature and Research Paradigm. *Adapted Physical Activity Quarterly*, *20*(4), 323-346.

Kumar, K. L. and Wideman, M. (2014). Accessible by design: Applying UDL principles in a first year undergraduate course. *The Canadian Journal of Higher Education*, *44*(1), 125.

Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners*. London: Sage Publications Limited.

Kurth, J. A. and Keegan, L. (2014). Development and use of curricular adaptations for students receiving special education services. *The Journal of Special Education*, *48*(3), 191-203.

Kurtts, S. A. (2006). Universal design for learning in inclusive classrooms. *Electronic Journal for Inclusive Education*, *1*(10), 7.

Kurtts, S. A., Matthews, C. E. and Smallwood, T. (2009). (Dis) solving the differences: A physical science lesson using universal design. *Intervention in school and clinic*, *44*(3), 151-159.

La, H., Dyjur, P. and Bair, H. (2018). *Universal Design for learning in higer education*. University of Calgary, Taylor institute for teaching and learning educational development unit. May 2018.

Lampropoulou, V. and Padeliadu, S. (1997) Teachers of the deaf as compared with other groups of teachers: Attitudes toward people with disabilities and inclusion. *American Annals of the Deaf*, 142(1) 26-33.

Lancioni, G. E. and Singh, N. N. (Eds.). (2014). *Assistive technologies for people with diverse abilities*. Springer Science and Business Media.

Langi, F. F. G., Oberoi, A., Balcazar, F. E. and Awsumb, J. (2017). Vocational rehabilitation of transition-age youth with disabilities: A propensity-score matched study. *Journal of Occupational Rehabilitation*, *27*(1), 15-23.

LaRocco, D. J. and Wilken, D. S. (2013). Universal design for learning: university faculty stages of concerns and levels of use a faculty action-research project. *Arizona State University*, *16*(1), 1-11.

Larson Jr, J. R., Juszczak, A. and Engel, K. (2016). Efficient vocational skills training for people with cognitive disabilities: an exploratory study comparing computer-assisted instruction to one-on-one tutoring. *Journal of Applied Research in Intellectual Disabilities*, *29*(2), 185-196.

Larson, B. E. (2000). Classroom discussion: a method of instructionand a curriculum outcome. *Teaching and Teacher Education*, *16*, 661–677.

Laughlin, R. (1995). Empirical research in accounting: Alternative approaches and a case for "middle-range" thinking. *Accounting, Auditing and Accountability Journal*, *8*(1), 63-87.

Laughlin, R. (2004). Putting the record straight: A critique of methodology choices and the construction of facts: some implications from the sociology of knowledge. *Critical Perspectives on Accounting*, *15*(2), 261-277.

Lee, S. H., Soukup, J. H., Little, T. D. and Wehmeyer, M. L. (2008). Student and teacher variables contributing to access to the general education curriculum for students with intellectual and developmental disabilities. *The Journal of Special Education*.

Lee, S. H., Wehmeyer, M. L., Soukup, J. H. and Palmer, S. B. (2009). Impact of Curriculum Modifications on Access to the General Education Curriculum for Students with Disabilities. *Exceptional Children*, *76*(2), 213-233.

Leptokaridou, E. T., Vlachopoulos, S. P. and Papaioannou, A. G. (2016). Experimental longitudinal test of the influence of autonomy-supportive teaching on motivation for participation in elementary school physical education. *Educational Psychology*, *36*(7), 1138-1159.

Levey, J. A. (2018). Universal design for instruction in nursing education: An integrative review. *Nursing education perspectives*, *39*(3), 156-161.

Lewis, R. B., Wheeler, J. J. and Carter, S. L. (2017). *Teaching students with special needs in general education classrooms*. Pearson.

Lieberman, L. J. (2017). The Need for Universal Design for Learning. *Journal of Physical Education, Recreation and Dance*, *88*(3), 5-7.

Lifshitz, J., Sullivan, P. G., Hovda, D. A., Wieloch, T. and McIntosh, T. K. (2004). Mitochondrial damage and dysfunction in traumatic brain injury. *Mitochondrion*, *4*(5-6), 705-713.

Lincoln, Y. S. (2007). *Naturalistic inquiry*. The Blackwell Encyclopedia of Sociology.

Lindqvist, E., Larsson, T. J. and Borell, L. (2015). Experienced usability of assistive technology for cognitive support with respect to user goals. *NeuroRehabilitation*, *36*(1), 135-149.

Lindsay, G. (2003). Inclusive education: A critical perspective. *British Journal of Special Education*, *30*(1), 3-12.

Lindsay, G. (2007). Rights, efficacy and inclusive education. In: R. Cigman (ed.) *Included or excluded? The challenge of the mainstream for some SEN children*. Oxon; New York: Routledge, 15-22.

Lipsky, D. K. and Gartner, A. (1996). Inclusion, school restructuring, and the remaking of American society. *Harvard Educational Review*, *66*(4), 762-797.

Llewellyn, A. and Hogan, K. (2000). The use and abuse of models of disability. *Disability and Society*, *15*(1), 157-165.

Lodico, M. G., Spaulding, D. T. and Voegtle, K. H. (2006). *Methods in educational research: From theory to practice*. San Francisco: Jossey-Bass.

Lopes-Murphy, S. (2012). Universal design for learning: Preparing secondary education teachers in training to increase academic accessibility of high school English learners. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *85*(6), 226-230.

Loreman, T., Deppeler, J. and Harvey, D. (2005). *Inclusive education: A practical guide to supporting diversity in the classroom*. London: RoutledgeFlamer.

Low, C. (2007). A defence of moderate inclusion and the end of ideology. In: R. Cigman (ed.) *Included or excluded?: The challenge of the mainstream for some SEN children*. New York: Routledge, 3-14.

Lu, Q. and Wood, L. (2006). The refinement of design for manufacture: inclusion of process design. *International Journal of Operations & Production Management*, *26*(10), 1123-1145.

Luecking, R. G., Fabian, E. S., Contreary, K., Honeycutt, T. C. and Luecking, D. M. (2018). Vocational rehabilitation outcomes for students participating in a model transition program. *Rehabilitation Counseling Bulletin*, *61*(3), 154-163.

Lundqvist, J., Mara, A. W., & Siljehag, E. (2015). Inclusive Education, Support Provisions and Early Childhood Educational Pathways in the Context of Sweden: A Longitudinal Study. *International journal of special education*, 30(3), 3-16.

Lynis, M. and Breakwell, S. H.-S. (2006). *Research Methods in Psychology*. SAGE.

Manheim, L. M., Halper, A. S. and Cherney, L. (2009). Patient-reported changes in communication after computer-based script training for aphasia. *Archives of physical medicine and rehabilitation*, *90*(4), 623-627.

Mansell, J. (2010). *Raising our sights: services for adults with profound intellectual and multiple disabilities*. Available from https://www.mencap.org.uk/sites/default/files/201606/Raising_our_Sights_report.pdf [Accessed 02 May 2014]

Marino, M. T., Gotch, C. M., Israel, M., Vasquez III, E., Basham, J. D. and Becht, K. (2014). UDL in the middle school science classroom: Can video games and alternative text heighten engagement and learning for students with learning disabilities? *Learning Disability Quarterly*, *37*(2), 87-99.

Marks, D. (1999). *Disability: Controversial debates and psychosocial perspectives*. London: Routledge.

Martin, B. and Hanington, B. M. (2012). *Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions*. Beverly, MA: Rockport Publishers.

Maykut, P. and Morehouse, R. (1994). *Beginning qualitative research: a philosophic and practical guide*. London: Falmer Press.

Mayoh, J. and Onwuegbuzie, A. J. (2015). Toward a conceptualization of mixed methods phenomenological research. *Journal of Mixed Methods Research*, *9*(1), 91-107.

Mayring, P. (2004). Qualitative content analysis*. A companion to qualitative research*, *1*, 159-176.

Mayring, P. and Fenzl, T. (2016). *Qualitative content analysis program qcamap–an open access text analysis software*.

McDonnell, J., Thorson, N., Disher, S., Mathot-Buckner, C., Mendel, J. and Ray, L. (2003). The Achievement of Students with Developmental Disabilities and Their Peers Without Disabilities in Inclusive Settings: An Exploratory Study. *Education and Treatment of Children*, *26*(3).

McGuire, J. M., Scott, S. S. and Shaw, S. F. (2003). Universal design for instruction: The paradigm, its principles, and products for enhancing instructional access. *Journal of postsecondary education and disability*, *17*(1), 11-21.

Mcguire, J. M., Scott, S. S. and Shaw, S. F. (2006). Universal design and its applications in educational environments. *Remedial and special education*, *27*(3), 166-175.

McMahon, D. D., Cihak, D. F., Wright, R. E. and Bell, S. M. (2016). Augmented reality for teaching science vocabulary to postsecondary education students with intellectual disabilities and autism. *Journal of Research on Technology in Education*, *48*(1), 38-56.

Mechling, L. C., Gast, D. L. and Gustafson, M. R. (2009). Use of video modeling to teach extinguishing of cooking related fires to individuals with moderate intellectual disabilities. *Education and Training in Developmental Disabilities*, 67-79.

Memisevic, H. and Hodzic, S. (2011). Teachers' attitudes towards inclusion of students with intellectual disability in Bosnia and Herzegovina. *International Journal of Inclusive Education*, *15*(7), 699-710.

Meo, G. (2008). Curriculum planning for all learners: Applying universal design for learning (UDL) to a high school reading comprehension program. *Preventing School Failure: Alternative Education for Children and Youth*, *52*(2), 21-30.

Mertens, D. M. and McLaughlin, J. A. (2004). Research and evaluation methods in special education. Corwin Press. *Methodology: Theory and Practice*, *8*, 173-184.

Messinger-Willman, J. and Marino, M. T. (2010). Universal design for learning and assistive technology: Leadership considerations for promoting inclusive education in today's secondary schools. *Nassp Bulletin*, *94*(1), 5-16.

Meyer, A., Rose, D. H. and Gordon, D. (2014). *Universal Design for Learning: Theory and Practice*. Wakefield, MA: CAST.

Migliore, A. and Landa, C. (2019). *Data Note: Exiting Vocational Rehabilitation with Employment, by Race, for Individuals with Intellectual Disability*.

Miller, D. K. and Lang, P. L. (2016). Using the universal design for learning approach in science laboratories to minimize student stress. *Journal of Chemical Education*, *93*(11), 1823-1828.

Ministry of Education of Saudi Arabia. (2017). *The principles underlying education in Saudi Arabia*. Retrieved from: https://www.moe.gov. sa/ar /PublicEducation /Residents AndVisitor s/ Pages/TheGeneralPrinciples.aspx.

Ministry of Education of Saudi Arabia. (2018). *Education sector allocations in the 2018 budget*. Retrieved from: https://www.moe.gov.sa/ar/news/Pages/moe-bud.aspx.

Ministry of Education. (2002). *Regulations of special education programs and institutes of Saudi Arabia*. [online]. Available at: http://www.se.gov.sa/rules/se_rules/index.htm (Accessed 13 March 2011).

Ministry of Education. (2008). *National report on education development in the kingdom of Saudi Arabia*. In: 48th Session Education International Conference, 25-28 November, Geneva. 1-108. Available from http://www.ibe.unesco.org/National_Reports/ICE_2008/saudiarabia_NR08_en.pdf [Accessed 10 August 2016]

Ministry of Education. (2014). *Explanatory memorandum and implementing regulations for Regulation of Students' Assessment*. Riyadh: Ministry of Education.

Ministry of Education. (2015). *The regulation of students' assessment*. Riyadh: Ministry of Education.

Ministry of Education. (2016). *Explanatory note and the executive rules of student evaluation regulations*. Ministry of Education https://departments.moe.gov.sa/GACEducationalPrograms/Forms/Pages/Rules.aspx

Ministry of Education. (2019). *Education and Vision 2030*. https://www.moe.gov.sa/en/Pages/vision2030.aspx. *Copyrights, Ministry of Education – Kingdom of Saudi Arabia.* Last modified 23/3/2019.

Minke, K. M., Bear, G. G., Deemer, S. A. and Griffin, S. M. (1996). Teachers' experiences with inclusive classrooms: Implications for special education reform. *The Journal of Special Education*, *30*(2), 152-186.

Mitchell, B. and Alfuraih, A. (2018). The Kingdom of Saudi Arabia: Achieving the aspirations of the National Transformation Program 2020 and Saudi Vision 2030 Through Education. *Journal of Education and Development*, *2*(3), 36.

Mitchell, D. (2005). Introduction: Sixteen propositions on the contexts of inclusive education. In: D. Mitchell (ed.) *Contextualizing inclusive education: Evaluating old and new international perspectives.* London: Routledge, 1-21.

Mittler, P. (2000). *Working towards inclusive education: social contexts*. London: David Fulton.

Montague, M., Warger, C., & Morgan, T. H. (2000). Solve it! Strategy instruction to improve mathematical problem solving. *Learning Disabilities Research & Practice,* 15(2), 110-116.

Moody, A. K., Justice, L. M. and Cabell, S. Q. (2010). Electronic versus traditional storybooks: Relative influence on preschool children's engagement and communication. *Journal of Early Childhood Literacy*, *10*(3), 294-313.

Moore, E. C. (1961). *American Pragmatism*. Peirce, James, and Dewey. https://philpapers.org/rec/MOOAPP-4.

Morgan, D. L. (2007). Paradigms lost and pragmatism regained. *Journal of Mixed Methods research*, *1*(1), 48-76.

Morley, D., Bailey, R., Tan, J. and Cooke, B. (2005). Inclusive physical education: Teachers' views of including pupils with special educational needs and/or disabilities in physical education. *European Physical Education Review*, *11*(1), 84-107.

Mugenda, G. (2011). *Research Methods. Quantitative and Qualitative Approaches*. Nairobi: Acts Press.

Mull, C. A. and Sitlington, P. L. (2003). The role of technology in the transition to postsecondary education of students with learning disabilities: A review of the literature. *The Journal of Special Education*, *37*(1), 26-32.

Mullick, J., Deppeler, J. and Sharma, U. (2012). Inclusive education reform in primary schools of Bangladesh: Leadership challenges and possible strategies to address the challenges. *International Journal of Whole Schooling*, *8*(1), 1-20.

Munir, K. M. (2016). The co-occurrence of mental disorders in children and adolescents with intellectual disability/intellectual developmental disorder. *Current Opinion in Psychiatry*, *29*(2), 95–102. https://doi.org/10.1097/yco.0000000000000236.

Murdaca, A., Cuzzocrea, F., Oliva, P. and Larcan, R. (2012). Mental Retardation and Learning Integrating Skills: Application of Didactic Software. *International Journal of Digital Literacy and Digital Competence (IJDLDC)*, *3*(2), 64-76.

Murray, A. and Novak, J. (2008). The faculty perspective on universal design for learning. *Journal of Postsecondary Education and Disability*, *21*(2), 60-69.

Murry, F. R. and Alqahtani, R. M. A. (2015). Teaching special education law in Saudi Arabia: Improving pre-service teacher education and services to students with disabilities. *World Journal of Education*, *5*(6), 57-64.

Narkon, D. E. and Wells, J. C. (2013). Improving reading comprehension for elementary students with learning disabilities: UDL enhanced story mapping. *Preventing School Failure: Alternative Education for Children and Youth*, *57*(4), 231-239.

National Center on Universal Design for Learning. (2017). (2010, Mar 17). *UDL: Principles and Practice*.

National Centre on Educational Restructuring and Inclusion NCERI. (1994). *National Study of Inclusive Education*. New York: City University of New York.

Nepi, L., Fioravanti, J., Nannini, P. and Peru, A. (2015). Social acceptance and the choosing of favourite classmates: A comparison between students with special educational needs and typically developing students in a context of full inclusion. *British Journal of Special Education*, *42*(3) 319-337.

Newman, L., Wagner, M., Huang, T., Shaver, D., Knokey, A. M., Yu, J., ... and Cameto, R. (2011). *Secondary School Programs and Performance of Students with Disabilities: A Special Topic Report of Findings from the National Longitudinal Transition Study-2 (NLTS2)*. NCSER 2012-3000. National Center for Special Education Research.

Noble, T. (2004). Integrating the revised Bloom's taxonomy with multiple intelligences: A planning tool for curriculum differentiation. *Teachers College Record*, *106*(1), 193-211.

Norwich, B. (2004). Moderate learning difficulties and inclusion: the end of a category? In: *British Educational Research Association Annual Conference, 16-18 September, Manchester.* Available from http://www.leeds.ac.uk/educol/documents/00003833.htm [Accessed 10 September 2016].

Norwich, B. (2014). Categories of special educational needs. In: Florian Lani. (ed.) *The SAGE handbook of special education*. 2nd edition. Los Angeles, California: Sage, 55-66.

Norwich, B. and Gray, P. (2007). Special schools in the new era: conceptual and strategic perspectives, inSpecial Schools in a New Era: how do we go beyond generalities. *Special Educational Needs Policy Options Paper*, *2*, 28-34.

Nowicki, E. A. (2003). A meta-analysis of the social competence of children with learning disabilities compared to classmates of low and average to high achievement. *Learning Disability Quarterly*, *26*(3), 171-188.

Odom, S. L., Buysse, V. and Soukakou, E. (2011). Inclusion of Young Children With Disabilities A Quarter Century of Research Perspectives. *Journal of Early Intervention*, *33*(4), 344-356.

Ojok, P. and Wormnæs, S. (2013). Inclusion of pupils with intellectual disabilities: primary school teachers' attitudes and willingness in a rural area in Uganda. *International Journal of Inclusive Education*, *17*(9), 1003-1021.

Ok, M., Rao, K., Bryant, B. and McDougall, D. (2016). Universal Design for Learning in Pre-K to Grade 12 Classrooms: A Systematic Review of Research. *Exceptionality*, *25*(2), 116-138. http://dx.doi.org/10.1080/09362835.2016.1196450

Olweus, D. (1993). *Bullying at school: what we know and what we can do*. Oxford: Blackwell.

Olweus, D. (1997). Bully/victim problems in school: Facts and intervention. *European Journal of Psychology of Education*, *XII*(4), 495-510.

Onwuegbuzie, A. J. and Leech, N. L. (2004). Enhancing the interpretation of significant findings: The role of mixed methods research. *The Qualitative Report*, *9*(4), 770-792.

Onwuegbuzie, A. J. and Teddlie, C. (2003). A framework for analyzing data in mixed methods research. *Handbook of mixed methods in social and behavioral research*, 351-383.

Organisation for Economic Co-Operation and Development (OECD). (2018). *Formative assessment: Improving learning in secondary classrooms*. Paris: OECD.

Organisation for Economic Co-operation and Development (OECD). (2008). *Students with Disabilities, Learning Difficulties and Disadvantages: Policies, Statistics and Indicators - 2007 Edition*. Paris: Organisation for Economic Co-operation and Development.

Owiny, R. L., Hollingshead, A., Barrio, B. and Stoneman, K. (2019). Engaging Preservice Teachers in Universal Design for Learning Lesson Planning. *Inclusion*, *7*(1), 12-23.

Padilla-Díaz, M. (2015). Phenomenology in educational qualitative research: Philosophy as science or philosophical science. *International Journal of Educational Excellence*, *1*(2), 101-110.

Pallant, J. (2001). *SPSS Survival manual: a step by step guide to data analysis using SPSS for windows (versions 10 and 11): SPSS student version 11.0 for windows*. Open University Press.

Pallant, J. (2013). *SPSS survival manual*. McGraw-Hill Education (UK).

Parvaiz, G. S., Mufti, O. and Wahab, M. (2016). Pragmatism for Mixed Method Research at Higher Education Level. *Business and Economic Review*, *8*(2), 67-79.

Passonneau, R. J., Bhardwaj, V., Salleb-Aouissi, A. and Ide, N. (2012). Multiplicity and word sense: evaluating and learning from multiply labeled word sense annotations. *Language Resources and Evaluation*, *46*(2), 219-252.

Pateman, C. (2013). *Participation and Inclusion Theories*. Cambridge, UK: Cambridge University Press.

Patokorpi, E. (2006). *Role of abductive reasoning in digital interaction*. Unpublished PhD Dissertation, Abo Akademi University, Finland.

Paul Gerrard, R. M. (2015). Mastering Scientific Computing with R. Packt Publishing. *Qualitative Research*, *6*, 97-113.

Peirce, C. S. (1878). The order of nature. *Popular Science Monthly*, *June*.

Peters, S. J. (2004). Inclusive education: An EFA strategy for all children. World Bank, *Human Development Network*.

Peters-Scheffer, N. C., Huskens, B., Didden, R. and van der Meer, L. (2016). Prelinguistic milieu teaching. In *Early intervention for young children with autism spectrum disorder* (151-175). Springer, Cham.

Piaget, J. (1936). (1952). The origins of intelligence in children New York: *International Universities Press.*

Piaget, J. (1976). Piaget's theory. In *Piaget and his school (11-23).* Springer, Berlin, Heidelberg.

Pintrich, P. R. (2000). An achievement goal theory perspective on issues in motivation terminology, theory, and research. *Contemporary educational psychology*, *25*(1), 92-104.

Pisha, B. and Coyne, P. (2001). Smart from the start: The promise of universal design for learning. *Remedial and special education*, *22*(4), 197-203.

Pliner, S. M. and Johnson, J. R. (2004). Historical, theoretical, and foundational principles of universal instructional design in higher education. *Equity & Excellence in Education*, *37*(2), 105-113.

Plotner, A. J. and Marshall, K. J. (2016). Supporting postsecondary education programs for individuals with an intellectual disability: Role of the vocational rehabilitation counselor. *Rehabilitation Counseling Bulletin*, *59*(4), 195-202.

Poppen, M., Lindstrom, L., Unruh, D., Khurana, A. and Bullis, M. (2017). Preparing youth with disabilities for employment: An analysis of vocational rehabilitation case services data. *Journal of Vocational Rehabilitation*, *46*(2), 209-224.

Qureshi, N. A., Al-Habeeb, A. A. and Koenig, H. G. (2013). Mental health system in Saudi Arabia: an overview. *Neuropsychiatr Dis Treat*, *9*, 1121-35.

Rajeh, M. (2013). *Obstacles to integration of students with intellectual disabilities in general schools as seen by teachers of Intellectual Education in Jizan.* MA. King Saud University.

Rakap, S. and Kaczmarek, L. (2010). Teachers' attitudes towards inclusion in Turkey. *European Journal of Special Needs Education*, *25*(1), 59-75.

Ralabate, P. (2016). *Your UDL Lesson Planner: The Step-by-step Guide for Teaching All Learners*. Brookes Publishing.

Ralabate, P. K. (2011). Universal Design for Learning: Meeting the Needs of All Students. *The ASHA Leader.*

Rao, K. and Meo, G. (2016). Using universal design for learning to design standards-based lessons. *SAGE Open*, *6*(4), 2158244016680688.

Rao, K., Ok, M. W. and Bryant, B. R. (2014). A review of research on universal design educational models. *Remedial and Special Education*, *35*(3), 153-166.

Rapp, W. (2014). *Universal design for learning in action: 100 ways to teach all learners*. Brookes Publishing.

Rappolt-Schlichtmann, G., Daley, S. G., Lim, S., Lapinski, S., Robinson, K. H., & Johnson, M. (2013). Universal Design for Learning and elementary school science: Exploring the efficacy, use, and perceptions of a web-based science notebook. *Journal of Educational Psychology*, 105(4), 1210.

Raskind, M. H. (1994). Assistive technology for adults with learning disabilities: A rationale for use. *Learning disabilities in adulthood: Persisting problems and evolving issues*, 152-162.

Rast, J. E., Roux, A. M. and Shattuck, P. T. (2019). Use of Vocational Rehabilitation Supports for Postsecondary Education Among Transition-Age Youth on the Autism Spectrum. *Journal of Autism and Developmental Disorders*, 1-10.

Reeve, J., Jang, H., Carrell, D., Jeon, S. and Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. *Motivation and emotion*, *28*(2), 147-169.

Reid, G. (2005). *Learning styles and inclusion*. Sage. First publish. Paul chapman publish. https://books.google.co.uk/books?hl=ar&lr=&id=e2ZBXcqSCsUC&oi=fnd&pg=PT13&dq=inclusion%2BReid&ots=vnWqlggIer&sig=ZJl18yT3U1csg0Ko3xAqEjX851k&redir_esc=y#v=onepage&q=inclusion%2BReid&f=false.

Reid, G., Strnadová, I. and Cumming, T. (2013). Expanding horizons for students with dyslexia in the 21st century: universal design and mobile technology. *Journal of Research in Special Educational Needs*, *13*(3), 175-181.

Resnik, D. (2016). *What is Ethics in Research and Why is it Important?* Niehs.nih.gov. Retrieved 30 March 2016, from http://www.niehs.nih.gov/research/resources/bioethics/whatis./

Reynhout, G. and Carter, M. (2007). Social Story efficacy with a child with autism spectrum disorder and moderate intellectual disability. *Focus on Autism and Other Developmental Disabilities*, *22*(3), 173-181.

Riccio, C. A., Sullivan, J. R. and Cohen, M. J. (2010). *Neuropsychological assessment and intervention for childhood and adolescent disorders*. US: John Wiley and Sons.

Rief, S. F. (2015). *The ADHD book of lists: A practical guide for helping children and teens with attention deficit disorders*.

Rieser, R. (2012). Implementing inclusive education: *A Commonwealth guide to implementing Article 24 of the UN Convention on the Rights of Persons with Disabilities.* 2nd edition. London: Commonwealth Secretariat.

Riffel, L. A., Wehmeyer, M. L., Turnbull, A. P., Lattimore, J., Davies, D., Stock, S. and Fisher, S. (2005). Promoting independent performance of transition-related tasks using a palmtop PC-based

self-directed visual and auditory prompting system. *Journal of Special Education Technology*, *20*(2), 5-14.

Roberts, K. D., Park, H. J., Brown, S. and Cook, B. (2011). Universal Design for Instruction: A Systematic Review of Empirically Based Articles. *Journal of Postsecondary Education and Disability*, *24*(1), 5-1.

Robson, C. (ed.). (2002). *Real world research*. Oxford, UK: Blackwell Publisher.

Romanowski, M. H. and Al-Hassan, F. S. (2013). Arab Middle Eastern women in Qatar and their perspectives on the barriers to leadership: Incorporating transformative learning theory to improve leadership skills. *Near and Middle Eastern Journal of Research in Education*, 2013(1), 3.

Rose, D. (2000). Universal design for learning. *Journal of Special Education Technology*, *15*(3), 45-49.

Rose, D. H. and Gravel, J. W. (2009). Getting from here to there: UDL, global positioning systems, and lessons for improving education. *A policy reader in universal design for learning*, 5-18.

Rose, D. H. and Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning*. Association for Supervision and Curriculum Development, 1703 N. Beauregard St., Alexandria, VA 22311-1714.

Rose, D. H. and Meyer, A. (2006). *A practical reader in universal design for learning*. Harvard Education Press. 8 Story Street First Floor, Cambridge, MA 02138.

Rose, D. H. and Strangman, N. (2007). Universal design for learning: Meeting the challenge of individual learning differences through a neurocognitive perspective. *Universal Access in the Information Society*, *5*(4), 381-391.

Rose, D. H., and Meyer, A. (2012). *Teaching Every Student in the Digital Age: Universal Design for Learning*. Alexandria, VA: ASCD.

Rose, D. H., Harbour, W. S., Johnston, C. S., Daley, S. G. and Abarbanell, L. (2006). Universal Design for Learning in Postsecondary Education: Reflections on Principles and their Application. *Journal of Postsecondary Education and Disability*, *19*(2), 135-151.

Rose, R. and Howley, M. (2007). *The practical guide to special educational needs in inclusive primary classrooms*. London: Paul Chapman.

Ross, D. (2011). Universal Design for Learning in Postsecondary Education. *Reflections on Principles and their Application*, *9*(2), 1-17.

Rousan, F. (2000). *Studies and research in special education*. Amman: Dar thought, the first edition.

Roux, A. M., Rast, J. E. and Shattuck, P. T. (2018). State-level variation in vocational rehabilitation service use and related outcomes among transition-age youth on the autism spectrum. *Journal of Autism and Developmental Disorders*, 1-13.

Roy, A., Guay, F. and Valois, P. (2013). Teaching to address diverse learning needs: Development and validation of a differentiated instruction scale. *International Journal of Inclusive Education*, *17*(11), 1186-1204.

Sadler-Smith, E. and J Smith, P. (2004). Strategies for accommodating individuals' styles and preferences in flexible learning programmes. *British journal of educational technology*, *35*(4), 395-412.

Saito-Kitanosako, Y. (2008). *Applying principles of universal design for learning to early elementary math classes in Japan: A case study*. University of Kansas, 1-137.

Sale, J., Lohfeld, L. and Brazil, K. (2002). Revisiting the quantitative-qualitative debate: Implications for mixed-methods research. *Quality and Quantity*, *36*(1), 43-53.

Savolainen, H., Engelbrecht, P., Nel, M. and Malinen, O. P. (2012). Understanding teachers' attitudes and self-efficacy in inclusive education: Implications for pre-service and in-service teacher education. *European Journal of Special Needs Education*, *27*(1), 51-68.

Scheffler, I. (2013). *Four pragmatists: A critical introduction to Peirce, James, Mead, and Dewey*. Routledge.

Schelly, C. L., Davies, P. L. and Spooner, C. L. (2011). Student Perceptions of Faculty Implementation of Universal Design for Learning. *Journal of Postsecondary Education and Disability*, *24*(1), 17-28.

Schoenberg, M. R., Ruwe, W. D., Dawson, K., McDonald, N. B., Houston, B. and Forducey, P. G. (2008). Comparison of functional outcomes and treatment cost between a computer-based cognitive rehabilitation teletherapy program and a face-to-face rehabilitation program. *Professional Psychology: Research and Practice*, *39*(2), 169.

Schumm, J. S. and Vaughn, S. (1995). Meaningful professional development in accommodating students with disabilities lessons learned. *Remedial and special Education*, *16*(6), 344-353.

Schwab, S., Gebhardt, M., Krammer, M., & Gasteiger-Klicpera, B. (2015). Linking self-rated social inclusion to social behaviour. An empirical study of students with and without special education needs in secondary schools. *European Journal of Special Needs Education*, 30(1), 1-14.

Seels, B. and Glasgo, R. (1990). *Exercises in instructional design*. Columbus, OH: Merill Publishing Co.

Sermier Dessemontet, R., Morin, D. and Crocker, A. G. (2014). Exploring the relations between in-service training, prior contacts and teachers' attitudes towards persons with intellectual disability. *International Journal of Disability, Development and Education*, *61*(1), 16-26.

Shadreck, M. (2012). Bachelor of education in service teacher trainees' perceptions and attitudes on inclusive education in Zimbabwe. *Asian Social Science*, *8*(13) 227-232.

Shah, N. (2012). Study Finds Districts Buying Into Universal Design; But many education leaders still aren't sure what UDL is (universal design for learning). *Education Week*, May 23, 2012, *Vol.31*(32), 7, ISSN: 0277-4232.

Shakespeare, T. (2009). Disability: A complex interaction. In: Daniels, H., Lauder, H. and Porter, J. (eds.) *Knowledge, values and education policy: A critical perspective.* London: Routledge, 184-198.

Sharma, U. and Sokal, L. (2015). The impact of a teacher education course on pre-service teachers' beliefs about inclusion: an international comparison. *Journal of Research in Special Educational Need*s, *15*(4), 276-284.

Shaw Academy. (2016). *Online Photography Course*. https://join.shawacademy.com/online-photography-course. Accessed: 3/5/2017.

Shaw, R. A. (2011). Employing universal design for instruction. *New Directions for Student Services*, *134*(2011), 21-33.

Shogren, K. A., Gross, J. M., Forber-Pratt, A. J., Francis, G. L., Satter, A. L., Blue-Banning, M. and Hill, C. (2015). The perspectives of students with and without disabilities on inclusive schools. *Research and Practice for Persons with Severe Disabilities*, *40*(4), 1-39.

Sicile-Kira, C. (2011, March 19). *What IQ Tests Really Tell Us About Children with Autism*. Retrieved June 19, 2019, from Psychology Today website: https://www.psychologytoday.com/us/blog/the-autism-advocate/201103/what-iq-tests-really-tell-us-about-children-autism.

Silverman, D. (2006). *Doing Qualitative Research: A Practical Handbook*. London: Sage Publications.

Silverman, D. (2010). *Qualitative Research*. SAGE.

Singh, K. D. (2015). Creating your own qualitative research approach: Selecting, integrating and operationalizing philosophy, methodology and methods. *Vision*, *19*(2), 132-146.

Skidmore, D. (2004). *Inclusion: The: The dynamic of school development*. Maidenhead: Open University Press.

Smith, F., Leconte, P. and Vitelle, E. (2012). The VECAP position paper on universal design for learning for career assessment and vocational evaluation. *Vocational Evaluation and Career Assessment Journal*, *8*(1), 13-26.

Smith, S. J. and Harvey, E. E. (2014). K-12 online lesson alignment to the principles of Universal Design for Learning: the Khan Academy. *Open Learning: The Journal of Open, Distance and E-Learning*, *29*(3), 222-242.

Smolka, A. L., Nogueira, A. L. H., Dainez, D., & de Laplane, A. L. F. (2019). Vygotsky's Theoretical and Conceptual Contributions to Qualitative Research in Education. *In Oxford Research Encyclopedia of Education.*

Song, Y. (2017). *To what extent is Universal Design for Learning "universal"? A case study in township special needs schools in South Africa*.

Southern, C. (2010). *General Education Teachers' Attitudes Toward the Inclusion of Students With Severe Disabilities*. Doctoral dissertation. Available from ProQuest Dissertations and Theses database. (UM No. AAT 3432514).

Spencer, S. A. (2011). Universal Design for Learning: Assistance for Teachers in Today's Inclusive Classrooms. *Interdisciplinary Journal of Teaching and Learning*, *1*(1), 10-22.

Spooner, F. and Browder, D. M. (2015). Raising the bar: Significant advances and future needs for promoting learning for students with severe disabilities. *Remedial and Special Education*, *36*(1), 28-32.

Spooner, F., Baker, J. N., Harris, A. A., Ahlgrim-Delzell, L. and Browder, D. M. (2007). Effects of training in universal design for learning on lesson plan development. *Remedial and special education*, *28*(2), 108-116.

Stanovich, P. J. and Jordan, A. (2002). Preparing general educators to teach in inclusive classrooms: Some food for thought. *The Teacher Educator*, *37*(3), 173-185.

Stock, S. E., Davies, D. K., Wehmeyer, M. L. and Lachapelle, Y. (2011). Emerging new practices in technology to support independent community access for people with intellectual and cognitive disabilities. *NeuroRehabilitation*, *28*(3), 261-269.

Stockall, N. S., Dennis, L. and Miller, M. (2012). Right from the start: Universal design for preschool. *Teaching Exceptional Children*, *45*(1), 10-17.

Strickland, A. (2011). *Universal Design for Learning, Access to General Curriculum for Students with Severe intellectual disabilities*. East Carolina University, 1-44. Systematic Sampling - Systematic Random Sampling. (n.d.). Retrieved from https://explorable.com/systematic-sampling. 12/09/2017.

Strogilos, V. and Stefanidis, A. (2015). Contextual antecedents of co-teaching efficacy: Their influence on students with disabilities' learning progress, social participation and behaviour improvement. *Teaching and Teacher Education*, 47, 218-229.

Systematic Sampling - Systematic Random Sampling. (2017). Retrieved from https://explorable.com/systematic-sampling. 12/09/2017.

Tam, S. F. and Cheng, A. W. (2005). Self-concepts of parents with a child of school age with a severe intellectual disability. *Journal of Intellectual Disabilities*, *9*(3), 253-268.

Tardif-Williams, C. Y., Owen, F., Feldman, M., Tarulli, D., Griffiths, D., Sales, C., ... and Stoner, K. (2007). Comparison of interactive computer-based and classroom training on human rights awareness in persons with intellectual disabilities. *Education and Training in Developmental Disabilities*, *42*(1), 48.

Tashakkori, A. and Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches (Vol. 46)*. Sage.

Tashakkori, A. and Teddlie, C. (Eds.). (2010*). Sage handbook of mixed methods in social and behavioral research*. Sage.

The General Organization for Statistics. (2017). *The General Organization for Statistics: The prevalence of disability (difficulty) among the Saudi population*. https://www.stats.gov.sa/ar/news/230. 3 Mar 2019.

Thomas, J. G. and Baneyx, F. (1997). Divergent Effects of Chaperone Overexpression and Ethanol Supplementation on Inclusion Body Formation in Recombinant Escherichia coli. *Protein expression and purification*, *11*(3), 289-296.

Thompson, J., Ribuffo, C., Wood, L. and Browder, D. M. (2014). *Evidence-based practices for students with severe disabilities*. CEEDAR Document NO. IC-3. CEEDAR Center. Retrieved on August, 31, 2015.

Tiwari, A., Das, A. and Sharma, M. (2015). Inclusive education a “rhetoric” or “reality”? Teachers' perspectives and beliefs. *Teaching and Teacher Education*, *52*, 128-136.

Trochim, W. (2016). *Types of Designs*. Socialresearchmethods.net. Retrieved 5 April 2016, from http://www.socialresearchmethods.net/kb/destypes.php.

Trochim, W. and Donnelly, J. (2007). *The research methods knowledge base. 3rd edition*. Mason, Ohio: Thomson/Atomic Dog.

Tsuchimoto, Y., Mikawa, S., & Okawa, K. (2003, January). The deployment of UDL network on satellite circuit with training workshop. *In 2003 Symposium on Applications and the Internet Workshops, 2003. Proceedings.* (pp. 14-17). IEEE.

Tufford, L. and Newman P. (2010). Bracketing in qualitative research. *Qualitative Social Work Research and Practice*, *11*(1), 80–96.

Turkey, the Russian Federation, and Saudi Arabia. *European Journal of Open, Distance and E-learning*, *18*(2), 112-128.

Turnbull, A., Turnbull, R. and Wehmeyer, M. L. (2007). *Exceptional lives. Special education in today's schools*. Upper Saddle River, NJ: Pearson Merrill Prentice Hall .

UNEDITED, A. (2015). *Convention on the Rights of Persons with Disabilities*. United Nations, 2 September 2016, ADVANCE UNEDITED VERSION.

UNESCO. (1993). *Special Needs in the Classroom: Teacher Resource Pack*. Paris: UNESCO.

UNESCO. (2005). *Guidelines for inclusion: Ensuring access to education for all*. Paris: UNESCO.

UNESCO. (2010). *Inclusive Education on the Agenda*. Paris: UNESCO.

UNESCO. United Nations. (2018). *Implementation of the Convention on the Rights of Persons with Disabilities*. Department of Economic and Social Affairs Disability. https://www.un.org/development/desa/disabilities/ Accessed: 24 August 2019.

Usher, R. (1996). A critique of the neglected epistemological assumptions of educational research. In: D. Scott and R. Usher (eds.) *Understanding educational research.* London: Routledge, 9-32.

Varcoe, L. and Boyle, C. (2014). Pre-service primary teachers' attitudes towards inclusive education. *Educational Psychology*, *34*(3), 323-337.

Vargas, T. M., Beyer, R. and Flores, M. M. (2018). Coaching Athletes With Hidden Disabilities: Using Universal Design for Learning to Effectively Coach all Athletes. *International Sport Coaching Journal*, *5*(2), 176-182.

Vaz, C., Wee, C. W., Lee, G. P. S., Ingham, P. W., Tanavde, V. and Mathavan, S. (2015). Deep sequencing of small RNA facilitates tissue and sex associated microRNA discovery in zebrafish. *BMC genomics*, *16*(1), 950.

Vesel, J. and Robillard, T. (2013). Teaching mathematics vocabulary with an interactive signing math dictionary. *Journal of research on technology in education*, *45*(4), 361-389.

Vision (2030). *Vision 2030 Kingdom of Saudi Arabia*. Retrieved from: http://vision2030.gov.sa/en

Vitelli, E. M. (2015). Universal design for learning: Are we teaching it to preservice general education teachers? *Journal of Special Education Technology*, *30*(3), 166-178.

Vogt, W. P., Gardner, D. C. and Haeffele, L. M. (2012). *When to use what research design.* Guilford Press.

Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children*, *23*(3), 34-41.

Waal, D. C. (2001). *On Peirce*. Belmont, CA: Wadsworth.

Waitoller, F. R. and King Thorius, K. A. (2016). Cross-pollinating culturally sustaining pedagogy and universal design for learning: Toward an inclusive pedagogy that accounts for dis/ability. *Harvard Educational Review*, *86*(3), 366-389.

Walker, I. (2010). *Research methods and statistics*. Macmillan International Higher Education.

Walliman, N. (2017). *Research methods: The basics*. Routledge.

Wang, M. C., Reynolds, M. C. and Walberg, R. J. (Eds.). (2010). *Special Education - Research and Practice: Synthesis of Findings*. Oxford: Pergamon Press.

Warnock, B. (2005). Special schools or not? *Education Review*, *19*(1).

Watson, S. M. and Gable, R. A. (2010). *Using knowledge of student cognition to differentiate instruction. Reaching every learner: Differentiating instruction in theory and practice*.

Webb, K. and Hoover, J. (2015). Universal Design for Learning (UDL) in the Academic Library: A Methodology for Mapping Multiple Means of Representation in Library Tutorials. *College and Research Libraries*, *76*(4), 537-553. http://dx.doi.org/10.5860/crl.76.4.537.

Wehmeyer, M. L. (2006). Universal design for learning, access to the general education curriculum and students with mild mental retardation. *Exceptionality*, *14*(4), 225-235.

Wehmeyer, M. L. (2007). *Promoting self-determination in students with developmental disabilities*. New York: Guilford Press.

Wehmeyer, M. L., Lance, G. D. and Bashinski, S. (2002). Promoting access to the general curriculum for students with mental retardation: A multi-level model. *Education and Training in Mental Retardation and Developmental Disabilities*, 223-234.

Wehmeyer, M. L., Palmer, S. B., Smith, S. J., Davies, D. K. and Stock, S. (2008). The efficacy of technology use by people with intellectual disability: A single-subject design meta-analysis. *Journal of Special Education Technology*, *23*(3), 21-30.

Weiten, W. and Wight, R. D. (1992). Portraits of a discipline: An examination of introductory psychology textbooks in America. *Teaching psychology in America: A History*, 453-504.

Werner, S. and Grayzman, A. (2011). Factors influencing the intention of students to work with individuals with intellectual disabilities. *Research in Developmental Disabilities*, *32*(6), 2502-2510.

Westerberg, H. and Klingberg, T. (2007). Changes in cortical activity after training of working memory—a single-subject analysis. *Physiology and Behavior*, *92*(1-2), 186-192.

Westling, D. L. and Fox, L. (2009). *Teaching students with severe disabilities*. Columbus: Merrill.

Westwood, P. (2018). *Inclusive and adaptive teaching: Meeting the challenge of diversity in the classroom*. Routledge.

Westwood, P. S. (2009). *What teachers need to know about students with disabilities*. Aust Council for Ed Research.

White, F., Livesey, D. and Hayes, B. (2012). *Developmental psychology: From infancy to development*. Pearson Higher Education AU.

Wicks, A. C. and Freeman, R. E. (1998). Organization studies and the new pragmatism: Positivism, anti-positivism, and the search for ethics. *Organization science*, *9*(2), 123-140.

Wilkin, D. (2016). *Caring for the mentally handicapped child*. Routledge.

Wilson, A., Zeithaml, V., Bitner, M. J. and Gremler, D. (2016). *Services marketing: Integrating customer focus across the firm*.

Winter, E. C. (2006). Preparing new teachers for inclusive schools and classrooms. *Support for learning*, *21*(2), 85-91.

Wizikowski, H. T. (2013). *Academic support experiences and perceptions of postsecondary students with disabilities: A public and private university comparison*. CGU Theses and Dissertations, 76, 12-100.

Wolfe, P. S. and Hall, T. E. (2003). Making inclusion a reality for students with severe disabilities. *Teaching Exceptional Children*, *35*(4), 56-60.

Wolfensberger, W. (2012). *Normalization: The Principle of Normalization in Human Services*. Toronto: National Institute on Mental Retardation.

Wolgemuth, J. R., Erdil-Moody, Z., Opsal, T., Cross, J. E., Kaanta, T., Dickmann, E. M. and Colomer, S. (2015). Participants' experiences of the qualitative interview: Considering the importance of research paradigms. *Qualitative research*, *15*(3), 351-372.

Woodcock, S. and Vialle, W. (2010). The potential to learn: pre-service teachers' proposed use of instructional strategies for students with a learning disability. *Contemporary Issues in Education Research*, *3*(10), 27.

Wright, K. B. (2005). Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of computer-mediated communication*, *10*(3), JCMC1034.

Young, S. C. L. S. (2018). *The Effect of Teacher Attitude on the Progress of Autism Spectrum Disorder (ASD) Students in the General Education Population.* Doctoral dissertation, Union University.

Yousef, R. (2019). *Disability, social work, and social exclusion: new strategies for achieving social inclusion of people with physical disabilities in the Kingdom of Saudi Arabia.* Doctoral dissertation, University of Salford.

Zascavage, V. and Winterman, K. G. (2009). What middle school educators should know about assistive technology and universal design for learning. *Middle School Journal*, *40*(4), 46-52.

Zawacki-Richter, O., Kondakci, Y., Bedenlier, S., Alturki, U., Aldraiweesh, A. and Püplichhuysen, D. (2015). The development of distance education systems in Turkey, the Russian Federation and Saudi Arabia. *European Journal of Open, Distance and E-learning*, *18*(2), 112-128.

Zee, M. and Koomen, H. M. (2016). Teacher self-efficacy and its effects on classroom processes, student academic adjustment, and teacher well-being: A synthesis of 40 years of research. *Review of Educational research*, *86*(4), 981-1015.

Zhong, Y. (2012). Universal design for learning (UDL) in library instruction. *College & Undergraduate Libraries*, *19*(1), 33-45.

Zionts, L. E., Zalavras, C. G. and Gerhardt, M. B. (2005). Closed treatment of displaced diaphyseal both-bone forearm fractures in older children and adolescents. *Journal of Pediatric Orthopaedics*, *25*(4), 507-512.

Zoniou-Sideri, A. and Vlachou, A. (2006) Greek teachers' belief systems about disability and inclusive education. *International Journal of Inclusive Education*, *10*(4-5), 379-394.

APPENDICES

Appendix 1: Statement from King Fahad National Library in Riyadh to confirm that this study is a first study in Saudi Arabia regarding to the title.

المملكة العربية السعودية
مكتبة الملك فهد الوطنية
إدارة الإيداع النظامي

مكتبة الملك فهد الوطنية
King Fahad National Library

١٤٣٧/٤ /١٣

Statement

Enquiry about the registration for the subject of search (M.A / PHD)

Name: Ohud Adnan Saffar	Phone : -
Date: 23/1/2016	Email : -
University: University of Strathclyde	The Scientific Degree : PHD

Subject of search :

- **Universital design for learning with speacail education or mental desbility.**

Using of management only

This is to confirm that after checking the research topic in the deposit system of the library. It has been found that :

- ☑ **The topic is not being discussed .**
- ☐ **The topic is being discussed .**

Subject:

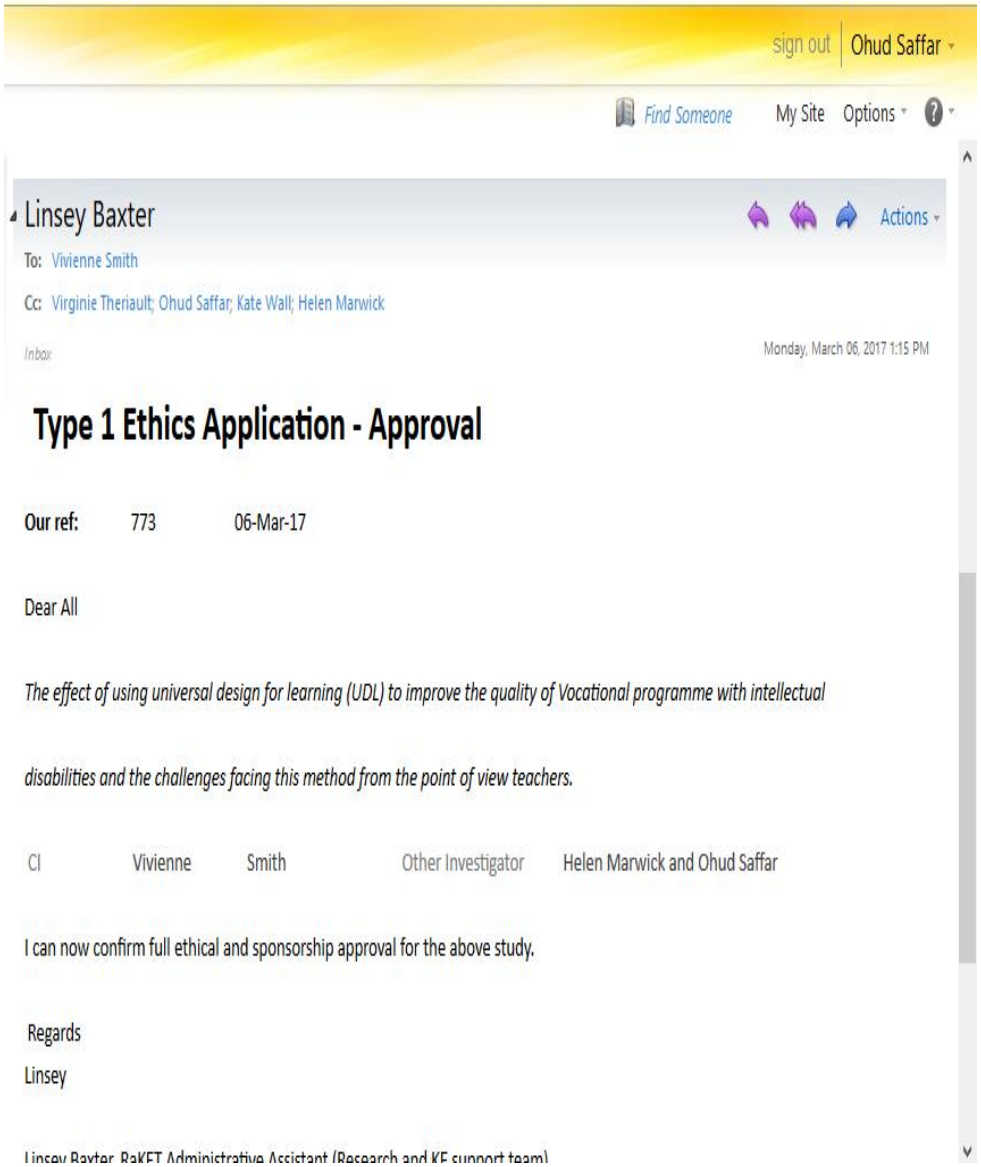
.....

.....

The Scientific Degree .....

مكتبة الملك فهد الوطنية إدارة الإيداع	**Date:** 23/1/2016	**Employee name :** Turki Al-Ammar
	Signature:	**Director of Administration :** Ahmad Al-Rashid

Appendix 2: Ethics Approval



sign out | Ohud Saffar

Find Someone | My Site | Options

Linsey Baxter

Actions

To: Vivienne Smith

Cc: Virginie Theriault; Ohud Saffar; Kate Wall; Helen Marwick

Inbox

Monday, March 06, 2017 1:15 PM

Type 1 Ethics Application - Approval

Our ref: 773 06-Mar-17

Dear All

The effect of using universal design for learning (UDL) to improve the quality of Vocational programme with intellectual disabilities and the challenges facing this method from the point of view teachers.

CI	Vivienne	Smith	Other Investigator	Helen Marwick and Ohud Saffar

I can now confirm full ethical and sponsorship approval for the above study.

Regards

Linsey

Linsey Baxter, RaKFT Administrative Assistant (Research and KE support team)

Appendix 3: Letter of Definition from Saudi Arabian Cultural Mission

Information Letter Ministry of Education

Name of department: School of Education.
Title of the study: The effect of using universal design for learning (UDL) to improve the quality of vocational programmes with intellectual disabilities and the challenges facing this method from the point of view of teachers.

Respected General of the Department of Special Education Administrator

Mr. ……,

My name is Ohud Saffar, PhD candidate from The Kingdom of Saudi Arabia, under the supervision of Dr. Vivienne Smith, Dr. Helen Marwick and Dr. Kate Wall, School of Education at The University of Strathclyde Glasgow, United Kingdom. I would like to request your permission to contact secondary heads of schools and teachers who are teaching intellectual disabilities in the merger of female schools. I am conducting a research project to investigate the effect of UDL on the learning of photography professional skills for students with intellectual disabilities, compared to students with non-special needs. The UDL method is a comprehensive framework that includes many strategies to connect and assess information (Alsalem, 2015a). This study also aims to explain the advantages and drawbacks that are faced by teachers using UDL in vocational programmes for intellectual disabilities students. Moreover, this study purpose is to assess if the UDL is an effective method for integrating intellectually disabled students with non-special needs students in the same classroom, from teachers' perspectives.

This study will be divided into two stages to collect my data. First, I will be asking the teachers to attend a workshop during March 2017. This workshop will last three to four hours and will be held in a lecture hall at King Saud University. A questionnaire will be distributed before and after the presentation and will take approximately 15 minutes to complete. Second, the students will be invited to join in two groups (experimental and control group) to train in photography, to be comprised of non-special educational needs and students with intellectual disabilities. Together, they will train in professional photography through the UDL method. The programme's activities have been designed to suit each of the students in the group. All students will be involved in the same activities during their art lessons; each lesson will last 30–45 minutes and will be held twice a week over the course of two to three months. There are no potential risks to taking part in this research. None of the research methods put the participants under stress or causes social or psychological harm.

With your permission, I would like to take the answer sheets and tools and the activities of students. All data from students will be confidential, and all personal information will be anonymised. I would also like to draw to your attention that your permission is voluntary, but that it will benefit the Saudi community through improving professional programmes for students. The School of Education has approved this research by The University of Strathclyde Glasgow Research Ethics policy. Findings from this study will be published in a thesis and possibly published in educational journals.

Researcher contact details:
If you require further information or have any other questions, please feel free to contact me or my academic supervisor.

Yours sincerely,

Ohud Saffar, PhD Education

The University of Strathclyde

Phone:

Email: ohud.saffar@strath.ac.uk

The research's academic supervisor: DR. Vivienne Smith.

Humanities and Social Sciences, School of Education

The University of Strathclyde 6 Richmond St, Glasgow G1 1XQ

Tel: +44 (0)141 444 8086

Email: Vivienne.smith@strath.ac.uk

The research's second academic supervisor: DR. Helen Marwick.

Humanities and Social Sciences, School of Education

The University of Strathclyde 6 Richmond St, Glasgow G1 1XQ

Tel: +44 (0)141 444 8073

Email: helen.marwick@strath.ac.uk

The research's third academic supervisor: Professor Kate Wall

Humanities and Social Sciences, School of Education

University of Strathclyde

Kate.wall@strath.ac.uk

+44 (0) 141 444 8067

This investigation was granted ethical approval by the School of Education Ethics Committee

If you have any questions/concerns, during or after the investigation, or wish to contact an independent person to whom any questions may be directed or further information may be sought from, please contact:

School of Education Ethics Committee

University of Strathclyde

Dr Virginie Theriault

Lecturer in Informal Education

School of Education

University of Strathclyde

141 St James Road

Glasgow G4 0LT

0141 444 8371

v.theriault@strath.ac.uk

Consent Form for [Ministry of Education]

Name of department: Education
Title of the study: The effect of using universal design for learning (UDL) to improve the quality of vocational programmes for students with intellectual disabilities and the challenges facing this method from the point of view of teachers.

Name of Researcher: Ohud Saffar

I have been informed about the aims and purposes of Ohud Saffar's research project. I as a result of this give my fully informed consent and grant my permission to allow Ohud Saffar to conduct her study by contacting Saudi female teachers and a head of schools in the secondary of mainstream schools who are working with the intellectual disability students. Ohud Saffar will collect the data by conducting a questionnaire and throughexperience the learning environment of the students with intellectual disabilities through observation. All of the data will be used solely for the purpose of the research and will be kept securely. Data collected will be strictly confidential and completely anonymous.

(PRINT NAME)	
Signature:	Date:

Appendix 4: Letter of Definition for the Schools

Information Letter Schools

Name of department: School of Education.
Title of the study: The effect of using universal design for learning (UDL) to improve the quality of vocational programmes with intellectual disabilities and the challenges facing this method from the point of view of teachers.

Dear Principal of school: ……..

Dear Mr ……,

My name is Ohud Saffar, PhD candidate from The Kingdom of Saudi Arabia, under the supervision of Dr. Vivienne Smith, Dr. Helen Marwick and Dr. Kate Wall, School of Education at The University of Strathclyde Glasgow, United Kingdom. I would like to request your permission to contact with teachers who are teaching intellectual disabilities in this school. I am conducting a research project to investigate the perspectives of Saudi Arabia secondary school teachers towards identifying the barriers that exist to implementing the universal design for learning (UDL) method in vocational rehabilitation programmes for students with intellectual disabilities. The UDL method is a comprehensive framework that includes many strategies to connect and assess information (Alsalem, 2015a). This study also aims to evaluate the UDL method from the perspective of teachers and to explore the impact of using the UDL method to improve vocational programmes for students with intellectual disabilities.

This study will be divided into two stages to collect my data. First, I will be asking the teachers to attend a workshop during March 2017. This workshop will last three to four hours and will be held in a lecture hall at King Saud University. A questionnaire will be distributed before and after the presentation and will take approximately 15 minutes to complete. Second, the students will be invited to join in two groups (experimental and control group) to train in photography, to be comprised of non-special educational needs and students with intellectual disabilities. Together, they will train in professional photography through the UDL method. The programme's activities have been designed to suit each of the students in the group. All students will be involved in the same activities during their art lessons; each lesson will last 30–45 minutes and will be held twice a week over the course of two to three months. There are no potential risks to taking part in this research. None of the research methods put the participants under stress or causes social or psychological harm. In addition, this programme is voluntary to participate in for teachers and students. This programme is also anonymous. No names will be recorded or attached to the data related to you or your

students. The results will only be made available for analysis under strictly confidential terms to the research team.

With your permission, I would like to take the answer sheets, tools and activity of students. All data from students will be confidential, and all personal information will be anonymised. I would also like to draw to your attention that your permission is voluntary, but that it will benefit the Saudi community through improving professional programmes for students. Findings from this study will be published in a thesis and possibly published in educational journals.

Researcher contact details:

Researcher sincerely,

Ohud Saffar, PhD Education

**Contact details of the researcher and the Strathclyde of University, it like the "Information Letter Ministry of Education"

Consent Form for [Head of school]

Name of department: Education

Title of the study: The effect of using universal design for learning (UDL) to improve the quality of vocational programmes with intellectual disabilities and the challenges facing this method from the point of view of teachers.

Name of Researcher: Ohud Saffar

I have been fully informed about the aims and purposes of the project.

I understand that:

- This programme is voluntary - there is no compulsion for the school to participate in this study.

- If the principal does not want to participate, this school may withdraw at any time.

- If the school does not want to participate in this research, you must notify the researcher.

- This programme is anonymous. No names will be recorded or attached to the data. The results will only be made available for analysis under strict confidentiality controls.

- The information obtained from this study may be published and used to develop future research, all data will remain strictly confidential, and any information used in publications will be anonymised.

(Print name of principal of school)	
Signature:	Date:

Appendix 5: Consent Form for Teachers in English

Participant Information Sheet for [Teachers workshop and apply experiment study].

Title of the study: The effect of using universal design for learning (UDL) to improve vocational programmes with intellectual disabilities and the challenges facing this method from the point of view of teachers.

Introduction

You are invited to participate in a research project as part of my PhD study at the University of Strathclyde Glasgow. My name is Ohud Saffar, a PhD student at the School of Education.

Contact details:

Email: Ohud.saffar@strath.ac.uk

What is the purpose of this study?

It seeks to achieve the following three goals:

- To investigate the effect of UDL on the learning of photography professional skills for students with intellectual disabilities, compared to students with non-special needs.

- To explain the advantages and drawbacks that are faced by teachers using UDL in vocational programmes for intellectual disabilities students.

- To assess if the UDL is an effective method for integrating intellectually disabled students with non-special needs students in the same classroom, from teachers' perspectives.

** Definition of UDL: The universal design for learning (UDL) method is a comprehensive framework that includes the use of varied means to display lessons, such as a computer and connect the information to the computers so that the learners can see pictures and hear sounds. It also includes multiple ways for students to express understanding of lessons through a list of tasks which a student deems suitable. Finally, it gives students multiple options and helps them integrate as an individual learning or learning in small groups.

Method and demands on participants:

If you accept this invitation to participate in the study, you will be asked two things: firstly, you will agree to attend a workshop, titled "Universal design for Learning" to help the researcher collate relevant data. This workshop will last four to six hours and will be held in a lecture hall at King Saud University. The exact date will be determined by the Ministry of Education and communicated to all participants by email. We also request your permission to fill a questionnaire before or after the workshop. The workshop will take approximately 15 minutes to complete. At the end of the workshop, teachers will be prepared with the appropriate tools for delivering photography lessons based on UDL.

Secondly, you will be asked to participate in the experimental study with students in one of the two groups. The first group is trained with the UDL. By contrast, a second group is receiving training in the original non-UDL programme at the same time for a whole academic term as part of the main experiment. This experimental study intervention will take about 3 months. Students will be taught the skill of photography. In addition, the photography lessons will be designed by the UDL programme for all students with intellectual disabilities and non-special needs who are in the first group. The classes will be observed at the rate of once a week over three months of lessons for about 30–45 minutes duration. At the workshop, it will be explained how you can use these tools.

With your consent, I would like to take pictures of the classroom activities, collect the answer sheets and measure performance using evaluation tools. I will need to be present in the classroom with and without the students for the purposes of conducting the research study. I will not interact with the students but I will observe teaching sessions.

The transcript will be sent to you for verification and editing purposes before the data are analysed and potentially published. Your responses will be anonymised to protect your identity. This programme is voluntary and teachers do not have to participate if they do not wish to. If you do participate, you may withdraw at any time up until completion of the experiment. If you did want to withdraw, please contact me by this email: Ohud.saffar@strath.ac.uk and you should also tell your school. If you do not want to participate in this research, you must notify your school. This programme is also anonymous. No names will be recorded or attached to the data related to you or your students. The

results will only be made available for analysis under strictly confidential terms to the research team.

* After completing the course, all teachers will receive certificates of attendance.

Why have you been invited to take part?

You have been selected to participate in this study because you are currently a teacher who works with students that have intellectual disabilities at a secondary school and / or mainstream school. This school delivers the topic of vocational rehabilitation.

What are the potential risks to you in taking part?

You may be concerned that interview responses may identify you in some way or that you will not be properly anonymised. To prevent this, the researcher will ensure that all information is protected and remains confidential. During transcription, your data will be anonymised by removing all identifying information, such as names and places. Your information will be coded to ensure that your confidentiality is maintained. I will additionally keep your consent form and any responses you provide in a secure, locked cabinet at the University of Strathclyde, Glasgow, United Kingdom. The questionnaires and any other research data will be erased after the analysis is complete.

What happens to the information in the study?

The data that will be collected will not contain any personal information about teachers. These data will be anonymous and will only be used for research purposes. Consent forms, and questionnaires will be safely locked in a cabinet at the University of Strathclyde, Glasgow, United Kingdom. Each record will be coded to protect participants' identities and will be destroyed after the data have been analysed. Once all the data have been collected, they will be transcribed and translated into English. The results will be anonymous and will be retained by my academic supervisors for five years. They will form the basis of a doctoral degree of research (PhD) by the lead researcher. Results will be presented in a doctoral thesis to independent examiners, and results may be published in reports and academic journals. However, all publications will preserve confidentiality and anonymity of teaching staff and students taking part.

Thank you for reading this information. Please, do not hesitate to contact the researcher to ask questions if you are unsure about anything that has been outlined here. Email: Ohud.saffar@strath.ac.uk

What happens next?

Participation in this study is entirely voluntary, and you are not under any obligation to provide your consent. If you wish to be included in the study, you will be asked to sign a consent form at a later date to confirm your agreement.

If you choose to provide your consent, you will receive a copy of the transcript of the recorded activities and experiences related to your participation. You will be asked for your permission prior to the data being revised and analysed.

Researcher contact details:

****Contact details of the researcher and the Strathclyde of University, it is like the "Information Letter Ministry of Education"**

Consent Form for [Teachers to workshop]

Name of department: Education

Title of the study: The effect of using universal design for learning (UDL) to improve vocational programmes for students with Intellectual disabilities and the challenges facing this method from the point of view of teachers.

- I confirm that I have read and understood the information sheet for the above project and the researcher has answered any queries to my satisfaction.
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences. If I exercise my right to withdraw and I do not want my data to be used, any data which have been collected from me will be destroyed.
- I understand that I can withdraw from the study any personal data (i.e. data which identifies me personally) at any time. Also, I should contact the researcher by email: Ohud.saffar@strath.ac.uk and tell my school.
- I understand that anonymised data (i.e. data which do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the investigation will remain confidential and no information that identifies me will be made publicly available.
- I consent to being a participant in the project.

(PRINT NAME)	
Signature of Participant:	Date:

Appendix 6: Consent Form for Teachers in Arabic

نموذج موافقة المعلمات على ورشة العمل وتطبيق تجربة الدراسة.

عنوان البحث: أثر استخدام التصميم الشامل في التعلم (UDL) لتحسين نوعية التدريب المهني للمعاقين فكريا والتحديات التي تواجه تطبيق هذه الطريقة من وجهت نظر معلمات التربية الخاصة.

مقدمة:

أنتٍ مدعوة لمشاركة في هذا البحث كجزء من متطلبات دراسة الدكتوراه في جامعة ستثراكلايد بجلاسكوا. اسمي عهود سفر طالبة دكتوراه في قسم التربية. البريد الالكتروني: aa_safar@yahoo.com

هدف الدراسة:

يسعى هذا البحث إلى تحقيق الأهداف الثلاثة التالية:

- التحقق من مدى تأثير UDL على تعلم المهارات المهنية والتصوير الفوتوغرافي لطالبات من ذوي الإعاقة الفكرية، مقارنة مع الطالبات من ذوي القدرات العادية.

- شرح مزايا وعيوب التي يواجهها المعلمون باستخدام UDL في برامج التدريب المهني لطالبات من ذوي الإعاقة الفكرية.

- تقييم إذا كان UDL هو وسيلة فعالة لدمج الطالبات من ذوي الإعاقة الفكرية مع الطالبات من ذوي القدرات العادية، من وجهة نظر المعلمات.

سوف يتم تحقيق هذه الاهداف بتقديم ورشة عمل للمعلمين لشرح الخطوات UDL وتدريبهم على كيفية تطبيق هذا الأسلوب لتعليم الطالبات من ذوي الإعاقة الفكرية واقرانهم العاديين من نفس المرحلة. أثناء انعقاد ورشة العمل سوف يتم توزيع استبيان لمعرفة المعيقات التي واجهت المعلمات أثناء التطبيق. وأخيرا، سيتم تقييم فعالية طريقة UDL عن طريق مقارنة نتائج الطالبات اللواتي يدرسن باستخدام برنامج التصميم الشامل مع الطالبات اللواتي يدرسن بطرق المعتادة. وسوف تتكون كل مجموعة من طالبات ذوي اعاقة فكرية وطالبات ذوي القدرات العادية.

دور المعلمة المشاركة في هذه الدراسة:

إذا اخترت السماح للمشاركة في هذه الدراسة، سيتم دعوتك للمشاركة لحضور ورشة عمل بعنوان "التصميم العام للتعليم" لمساعدة الباحث على وضع البيانات ذات الصلة. ورشة العمل هذه تحصل على التغذية الراجعة من المعلمين حول تصوراتهم حول استخدام طريقة UDL كوسيلة جديدة أو استراتيجية التدريب في برامج المهني. بالإضافة إلى ذلك، فإن الاستبيان يساعد على استكشاف التحديات التي تطرحها هذه الطريقة عندما ألقاها في المدارس في المملكة العربية السعودية. وستقدم ورشة العمل للمعلمين في المجموعة التجريبية فقط. في هذه الورشة، سيتم تقسيم ورشة العمل إلى مرحلتين. المرحلة الاولي: في بداية الورشة سيتم إعطاء المشاركين من المجموعة التجريبية ١٥ دقيقة لإكمال الاستبيان رقم ١. والهدف هو قياس معرفة خلفية المعلمات حول أسلوب UDL قبل شرح هذا المفهوم في ورشة العمل. ثانيا،

سوف يتم ألقاء المعلومات عن UDL أما في نهاية ورشة العمل، سوف يكون لدى المعلمات الاستعداد الكافي لتصميم درس التصوير الفوتوغرافي على أساس .UDL وسوف يكونوا قادرين على استخدام الاختبار القبلي والبعدي، وملاحظة الطالبات .

وعلاوة على ذلك، سوف يتم تدريس الطالبات مهارة التصوير باستخدام الكاميرا في كلا المجموعتين التجريبية والضابطة . في البداية سوف تقوم المعلمة بأجراء اختبار قبلي وبعدي للطالبات لمعرفة قدرة الطالبات على الانجاز. وسوف تقوم الباحثة والمعلمة باختيار سته طالبات الاتي سوف يتدربون باستخدام UDL (المجموعة التجريبية)، وبالمقابل سوف يتم اختيار سته طالبات (المجموعة الضابطة) اللواتي يتلقون التدريب بالطرق المعتادة. وبالإضافة إلى ذلك، سيتم تصميم دروس التصوير بواسطة برنامج UDL لجميع الطالبات المعاقين فكريا والطالبات من ذوي القدرات العادية. وسوف تتولى المعلمة تدريس الطالبات وتطبيق التجربة وسوف تقوم الباحثة بجمع البيانات بدون التأثير أو التفاعل المباشر على الطالبات. كما ان الباحثة سوف تساعد المعلمة في اعداد وتصميم أدوات الدرس.

أما بخصوص عنوان الدرس لتصوير الفوتوغرافي: سوف يتم التركيز على أخذ الصور (A4) التي تستخدم في جواز السفر والهوية الوطنية. أيضا سوف يتم التركيز على تعليم الطالبات التصوير بجودة عالية من ناحية تطبيق معايير التصوير كالاهتمام بوضوح الصورة وتأثيرات الضوء. التدريب على المهارات والتصوير الفوتوغرافي. وسوف يكون السؤال المطروح: "هل الطالبة مؤهلة الآن لممارسة التصوير كمهنة؟."

سيتم شرح الدرس مرة واحدة في الأسبوع لمدة ٣٠-٤٥ دقيقة. وبعد ترتيب الطالبات في المجموعات سوف يتم تطبيق الملاحظة في ع مراحل. المرحلة الاولى: سوف يتم ملاحظة الفصول الدراسة وقدرة المعلمة على تصميم الدرس بناء على التصميم الشامل لتعلم. أما المرحلة الثانية: خلال التجربة سوف يتم ملاحظة اداء وتطور الطالبات في كل يوم لمتابعة انجازهم لتحقيق الهدف المراد تعلمة. المرحلة الثالثة: وهي الملاحظة النهائية لإتقان الطالبات للمهارة.

بعد التجربة مع الطالبات، سيتم توزيع الاستبيان رقم ٢ على المعلمات المشاركات في المجموعة التجريبية. والهدف من ذلك هو لتسجيل آراء المعلمات حول تطبيق استراتيجية UDL في مدارسهم. كما ان الورشة سوف تعاد مرة أخرى للمعلمات في المجموعة الضابطة. وسوف يتم توزيع نفس الاستبيان رقم ١ و٢ للمعلمات في بداية ونهاية ورشة العمل. والهدف من ذلك هو مقارنة اراء من المعلمات من المجموعة التجريبية مع وجهت نظر المعلمات من المجموعة الضابطة حول تطبيق استراتيجية UDL في مدارسهم. من خلال المقارنة سيتم استكشاف الصعوبات التي واجهتهم خلال تنفيذ هذه الاستراتيجية. في النهاية، سيتم جمع البيانات لهذا البحث من الاستبيان، واختبار القبلي والبعدي وقوائم الملاحظة. بموافقتكم، وأود التقاط صور للأنشطة الصفية بدون الطالبات او المعلمات، وجمع أوراق الإجابات وقياس الأداء باستخدام أدوات التقييم. كما يجب ان يعلم جميع المعلمات بأن هذا البرنامج طوعي وتستطيع المعلمة رفض المشاركة او الانسحاب. وفي حال أن المعلمة لا تريد المشاركة يجب اخبار مدرستك بالرفض. واتعهد بأن تكون جميع بيانات الطالبات والمعلمات سريه ومجهولة المصدر بدون معلومات شخصية وسوف تستخدم فقط لتحليل نتائج البحث مع فريق البحث.

* بعد الانتهاء من ورشة العمل، سوف يحصلن المعلمات على شهادات حضور لدورة.

* سوف يتم اعطاء جميع المعلمات المشاركات شهادة تطوع لإنجاح التجربة لمدة ثلاثة أشهر.

لماذا تم دعوتك للمشاركة في هذه التجربة؟

لقد تم اختيارك للمشاركة في هذه الدراسة لأنكِ حاليا معلمة تربية خاصة لذوي الاعاقة الفكرية في مدارس الدمج الثانوية.

ما هي المخاطر المحتملة لكي عند المشاركة؟

لن يكون هناك اي مخاطر من هذه الدراسة ابدأ. ولتخلص من القلق من كشف الهوية الشخصية للمعلمة او الطالبة، سوف تجعل الباحثة كل الاستبيانات والاوراق والبيانات بأسماء وهميه ومجهولة وسرية. ولضمان الحفاظ على السرية الخاصة بك سوف تقوم الباحثة بتأمين هذه الاوراق في جامعة ستراثكلايد، غلاسكو، المملكة المتحدة. وسيتم مسح الاستبيانات والبيانات البحثية الأخرى بعد تحليل الكامل.

ماذا يحدث للمعلومات أثناء مرحلة الدراسة؟

ستكون هذه البيانات مجهولة وسوف تستخدم فقط لأغراض البحث العلمي. استمارات الموافقة، سيتم ترميز كل رقم قياسي لحماية هويات المشاركين وسيتم التخلص منها بعد تحليل البيانات. وسوف يتم نسخها وترجمتها إلى اللغة الإنجليزية لاستخدامها لأغراض الدراسة. وسيتم الاحتفاظ بهذه البيانات لمدة عامين حتى الحصول على درجة الدكتوراه. وستعرض النتائج في أطروحة الدكتوراه، ويجوز نشر النتائج في التقارير والمجلات الأكاديمية. ومع ذلك، فإن جميع المنشورات المحافظة على السرية وعدم الكشف عن هويته المشاركين في البحث.

شكرا لكم على قراءة هذه المعلومات. من فضلك، لا تترددوا في الاتصال بالباحثة لطرح الأسئلة لتأكد من أي نقطة غير مفهومة.

ماذا سوف يحدث بعد ذلك؟

المشاركة في هذه الدراسة هو طوعي تماما، وأنت لست تحت أي التزام لتقديم موافقتك. إذا كنت ترغب بالمشاركة في الدراسة، سوف يطلب منك التوقيع على استمارة الموافقة المرفقة لتأكيد موافقتك.

إذا اخترت تقديم موافقتك، سوف تتلقى نسخة من الأنشطة والخبرات المسجلة المتعلقة بمشاركتكم. وسوف يطلب منك الإذن قبل أن تنقح وتحلل البيانات.

بيانات التواصل:

أذا كنت بحاجة أي سؤال في المستقبل، لا تترددي بالتوصل مع الباحثة او المشرفين الاكاديمين:

****Contact details of the researcher and the Strathclyde of University, it is like the "Information Letter Ministry of Education"**

نموذج الموافقة للمعلمات

القسم: التربية

عنوان البحث: أثر استخدام التصميم الشامل لتعلم لتحسين البرنامج المهني للمعاقين فكريا والتحديات التي تواجه تطبيق هذه الطريقة من وجهت نظر المعلمات.

- اؤكد أنني قد قرأت وفهمت ورقة المعلومات للمشروع المذكور أعلاه والباحث قد أجاب على استفسارات لارتياحي.
- أنا أفهم أن مشاركتي طوعية وأنا حر في الانسحاب من المشروع في أي وقت، دون الحاجة إلى إعطاء سبب ودون أية عواقب. إذا مارست حقي في الانسحاب وأنا لا أريد بياناتي أن تستخدم، وسيتم تدمير أية بيانات تم جمعها مني.
- أنا أفهم أنه أستطيع الانسحاب من الدراسة بدون بيانات شخصية في أي وقت.
- أنا أفهم أن بياناتي سوف تكون مجهولة المصدر ولا يمكن كشفها بمجرد أن يتم تضمينها في الدراسة.
- أنا أفهم أن المعلومات المسجلة في التحقيق ستبقى سرية ولن تتاح للجمهور.
- أوافق على أن أكون أحد المشاركين في المشروع

انسخ الاسم:	**توقيع المشارك:**
التاريخ:	

Appendix 7: Consent Form for Parents of students in English

Participant Information Sheet for [Parents of students].

Title of the study: The effect of using universal design for learning (UDL) to improve the quality of the vocational programme for students with intellectual disabilities and the challenges facing this method from the point of view of teachers.

Introduction

Your daughter is invited to participate in a research project as part of my PhD study at the University of Strathclyde, Glasgow. My name is Ohud Saffar, a PhD student at the School of Education.

Contact details:

Email: Ohud.saffar@strath.ac.uk

What is the purpose of this study?

It seeks to achieve the following three goals:

- To investigate the effect of UDL on the learning of photography professional skills for students with intellectual disabilities, compared to students with non-special needs.

- To explain the advantages and drawbacks that are faced by teachers using UDL in vocational programmes for intellectual disabilities students.

- To assess if the UDL is an effective method for integrating intellectually disabled students with non-special needs students in the same classroom, from teachers' perspectives.

** Definition of UDL: The universal design for learning (UDL) method is a comprehensive framework that includes the use of varied means to display lessons, such as a computer and connect the information to the computers so that the learners can see pictures and hear sounds. It also includes multiple ways for students to express understanding of lessons through a list of tasks which a student deems suitable. Finally, it gives students multiple options and helps them integrate as an individual learning or learning in small groups.

Method and demands on participants:

If you choose to allow your daughter to participate in this study, she will be invited to join a small photography group comprised of regular students and students with intellectual

disabilities. Together, they will train in professional photography throughout the UDL method. The programme's activities have been designed to suit each of the students in the group. Your daughter will be participating in the art lessons; each lesson will last 30–45 minutes and will be held twice a week over the course of two to three months. A researcher will observe your daughter during those lessons while she will train in professional photography throughout the UDL method. During the photography lessons the researcher will write down notes on what the researcher sees. The researcher may also ask to copy any planning or photography your daughter does as your daughter creates it; your daughter will not be in the photos, just her work. Your daughter will also be asked by the researcher and her teacher to take a pre- and post-test for 30 minutes, individually, where the researcher will ask your daughter some questions about using the camera and take a picture. Some questions your daughter might be asked are: the types of camera, types of photographs, the steps to take a picture and the criteria for taking an image correctly. The implementation of the research project will not affect students' tuition, and students' grades will not depend on answering the test questions.

* After the research and training have ended, I will contact the relevant employers in an attempt to find employment for the students with intellectual disabilities in the field of photography.

* After completing the course, all students will receive certificates of attendance.

This programme is voluntary - students do not have to participate in the programme. If your daughter does participate, your daughter may withdraw at any time. If you want your daughter to withdraw, please contact me by this email: Ohud.saffar@strath.ac.uk and you should tell your daughter's school. If you do not want your daughter to participate in this research, you must notify your daughter's school. This programme is also anonymous. No names will be recorded or attached to the data.

Why has my daughter been invited to participate?

Your daughter has been selected to participate in this study because she is currently a student at a secondary school and mainstream school that is taking part in the research study. Each school delivers a vocational rehabilitation programme to students.

What are the potential risks of taking part in this research?

There are no potential risks to taking part in this research. None of the research methods put the participants under stress or cause social or psychological harm. This research is being conducted because the researchers are interested in questions about vocational training. For further information or to pose questions, please contact your daughter's school. If you do not want your daughter to participate, please complete the form below and return it to your daughter's school.

What happens to the information in the study?

The results will only be made available for analysis under strict confidentiality controls, and will only be used for research purposes. Consent forms, will be safely locked in a cabinet at the University of Strathclyde, Glasgow. Each record will be coded to protect participants' identities and will be destroyed after the data have been analysed. Once all the data have been collected, they will be transcribed and translated into English. The results will be anonymous and will be retained by my academic supervisors for five years.

What happens next?

Findings from this study will be published in a thesis and possibly published in educational journals. We will not use your daughter's name or that of the school's, yourself and your daughter's teacher will not be identified in any part of the research at the end. Thank you for reading this information. Please, do not hesitate to contact the researcher to ask questions if you are unsure about anything that has been outlined here. Email: Ohud.saffar@strath.ac.uk

Researcher contact details: If you require further information or have any other questions, please feel free to contact me or my academic supervisor (See the contact details).

Researcher sincerely,

Ohud Saffar, PhD Education

****Contact details of the researcher and the Strathclyde of University, it is like the "Information Letter Ministry of Education"**

Consent Form for [Parents of students]

Name of department: Education

Title of the study: The effect of using universal design for learning (UDL) to improve the quality of the vocational programmes for student with special needs and the challenges facing this method from the point of view of teachers.

- I confirm that I have read and understood the information sheet for the above project and the researcher has answered my queries to my satisfaction.
- I understand that my daughter's participation is voluntary and that she is free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any adverse consequences. If I exercise my right to withdraw and I don't want my data to be used, any data which have been collected concerning myself or my daughter will be destroyed.
- I understand that my daughter can withdraw from the study any personal data at any time. Also, I should contact the researcher by email: Ohud.saffar@strath.ac.uk and tell my daughter's school.

- I understand that anonymised data (i.e. .data which do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the investigation will remain confidential and no information that identifies me or my daughter will be made publicly available.
- I consent to my daughter participating in the study.

(PRINT NAME)	**(Please Print) The daughter's name is**
Signature of Participant:	**Date:**

Appendix 8: Consent Form for Parents of students in Arabic

نموذج موافقة أولياء أمور الطالبات لتعلم التصوير الفوتوغرافي.

عنوان البحث: أثر استخدام التصميم الشامل في التعلم (UDL) لتحسين نوعية التدريب المهني للمعاقين فكريا والتحديات التي تواجه تطبيق هذه الطريقة من وجهت نظر معلمات التربية الخاصة.

مقدمة: أنتٍ مدعوة لمشاركة في هذا البحث كجزء من متطلبات دراسة الدكتوراه في جامعة ستثراكلايد بجلاسكوا. اسمي عهود سفر طالبة دكتوراه في قسم التربية. البريد الالكتروني: aa_safar@yahoo.com

هدف الدراسة:

يسعى هذا البحث إلى تحقيق الأهداف الثلاثة التالية:

- التحقق من مدى تأثير UDL على تعلم المهارات المهنية والتصوير الفوتوغرافي لطالبات من ذوي الإعاقة الفكرية، مقارنة مع الطالبات من ذوي القدرات العادية.

- شرح مزايا وعيوب التي يواجهها المعلمون باستخدام UDL في برامج التدريب المهني لطالبات من ذوي الإعاقة الفكرية.

- تقييم إذا كان UDL هو وسيلة فعالة لدمج الطالبات من ذوي الإعاقة الفكرية مع الطالبات من ذوي القدرات العادية، من وجهة نظر المعلمات.

سوف يتم تحقيق هذه الاهداف بتقديم ورشة عمل للمعلمين لشرح الخطوات UDL وتدريبهم على كيفية تطبيق هذا الأسلوب لتعليم الطالبات من ذوي الإعاقة الفكرية واقرانهم العاديين من نفس المرحلة. أثناء انعقاد ورشة العمل سوف يتم توزيع استبيان لمعرفة المعيقات التي واجهت المعلمات أثناء التطبيق. وأخيرا، سيتم تقييم فعالية طريقة UDL عن طريق مقارنة نتائج الطالبات اللواتي يدرسن باستخدام برنامج التصميم الشامل مع الطالبات اللواتي يدرسن بطرق المعتادة. وسوف تتكون كل مجموعة من طالبات ذوي اعاقة فكرية وطالبات ذوي القدرات العادية.

دور ابنتكم في هذه الدراسة:

مدرسة ابنتكم سوف تشارك في مشروع بحثي كتجربة تربوية. إذا اخترتٍ الموافقة على مشاركة ابنتكم في هذه الدراسة، سيتم دعوتك ابنتكم للانضمام الى مجموعة صغيرة تتألف من الطالبات من ذوي الاحتياجات الخاصة ومجموعة من الطالبات من ذوي القدرات العادية. كلتا المجموعتين من الطالبات سوف يتم تدريبهم على مهنة التصوير الفوتوغرافي خلال أسلوب UDL . وسوف تمكن نتائج هذه التجربة الباحثة لتحديد مدى فعالية أسلوب UDL لتحسين البرامج المهنية للطالبات من ذوي الاحتياجات الخاصة مع اقرانهم العاديين. وقد تم تصميم أنشطة البرنامج لتتناسب مع كل الطالبات في المجموعة. وسيشارك جميع الطالبات في نفس الأنشطة خلال حصة الفنية. ومدة كل درس ٣٠-٤٥ دقيقة

وسوف تعقد مرتين في الأسبوع على مدى شهر الى شهرين. مع العلم أن تنفيذ هذا الدراسة البحثية لن تؤثر على الدرجات الدراسية لطالبات. هذا البرنامج هو تطوعي والمشاركة ليست إجباريه. كما انه تستطيع ابنتكم الانسحاب في أي وقت من الدراسة وبدون أي تكلفة. إذا كنت لا ترغب بمشاركة ابنتكم في هذا الدراسة، يجب عليكٍ أن تخبري مدرسة ابنتك بقرارك. واتعهد بأن تكون جميع بيانات الطالبات سريه ومجهولة المصدر بدون معلومات شخصية وسوف تستخدم فقط لتحليل نتائج البحث مع فريق البحث.

* بعد الانتهاء من هذه الدراسة، سوف يحصلن جميع الطالبات المشاركات على شهادات حضور لدورة التصوير الفوتوغرافي.

* سوف يتم اعطاء جميع الطالبات المشاركات شهادة تطوع لإنجاح التجربة لمدة ثلاثة أشهر.

لماذا تم دعوتك للمشاركة في هذه التجربة؟

لقد تم اختيار ابنتكم للمشاركة في هذه الدراسة لأنها حاليا طالبة في مدارس الدمج الثانوية.

ما هي المخاطر المحتملة لطالبة عند المشاركة؟

لن يكون هناك اي مخاطر من هذه الدراسة ابدأ. ولتخلص من القلق من كشف الهوية الشخصية للمعلمة او الطالبة، سوف تجعل الباحثة كل الاستبيانات والاوراق والبيانات بأسماء وهميه ومجهولة وسرية. ولضمان الحفاظ على السرية الخاصة بك سوف تقوم الباحثة بتأمين هذه الاوراق في جامعة ستراثكلايد، غلاسكو، المملكة المتحدة. وسيتم مسح الاستبيانات والبيانات البحثية الأخرى بعد تحليل الكامل.

ماذا يحدث للمعلومات أثناء مرحلة الدراسة؟

ستكون هذه البيانات مجهولة وسوف تستخدم فقط لأغراض البحث العلمي. استمارات الموافقة، سيتم ترميز كل رقم قياسي لحماية هويات المشاركين وسيتم التخلص منها بعد تحليل البيانات. وسوف يتم نسخها وترجمتها إلى اللغة الإنجليزية لاستخدامها لأغراض الدراسة. وسيتم الاحتفاظ بهذه البيانات لمدة عامين حتى الحصول على درجة الدكتوراه. وستعرض النتائج في أطروحة الدكتوراه، ويجوز نشر النتائج في التقارير والمجلات الأكاديمية. ومع ذلك، فإن جميع المنشورات المحافظة على السرية وعدم الكشف عن هويته المشاركين في البحث. شكرا لكم على قراءة هذه المعلومات. من فضلك، لا تترددوا في الاتصال بالباحثة لطرح الأسئلة لتأكد من أي نقطة غير مفهومة.

ماذا سوف يحدث بعد ذلك؟

المشاركة في هذه الدراسة هو طوعي تماما، وأنت لست تحت أي التزام لتقديم موافقتك. إذا كنت ترغب بالمشاركة في الدراسة، سوف يطلب منك التوقيع على استمارة الموافقة المرفقة لتأكيد موافقتك.

إذا اخترت تقديم موافقتك، سوف تتلقى نسخة من الأنشطة والخبرات المسجلة المتعلقة بمشاركتكم. وسوف يطلب منك الإذن قبل أن تنقح وتحلل البيانات.

بيانات التواصل:أذا كنت بحاجة أي سؤال في المستقبل، لا تترددي بالتوصل مع الباحثة او المشرفين الاكاديميين:

توقيع الباحثة:

Ohud Saffar, PhD Education

****Contact details of the researcher and the Strathclyde of University, it like the "Information Letter Ministry of Education"**

نموذج الموافقة لأولياء الامور

القسم: التربية

عنوان البحث: أثر استخدام التصميم الشامل لتعلم لتحسين البرنامج المهني للمعاقين فكريا والتحديات التي تواجه تطبيق هذه الطريقة من وجهت نظر المعلمات.

- اؤكد أنني قد قرأت وفهمت ورقة المعلومات للمشروع المذكور أعلاه والباحث قد أجاب على استفسارات لارتياحي.
- أنا أفهم أن مشاركة ابنتي طوعية وهي حره في الانسحاب من المشروع في أي وقت، دون الحاجة إلى إعطاء سبب ودون أية عواقب. إذا مارست حقها في الانسحاب وأنا لا أريد بيانات ابنتي أن تستخدم، وسيتم تدمير أية بيانات تم جمعها منها.
- أنا أفهم أن ابنتي تستطيع الانسحاب من الدراسة بدون بيانات شخصية في أي وقت.
- أنا أفهم أن بيانات ابنتي سوف تكون مجهولة المصدر ولا يمكن كشفها بمجرد أن يتم تضمينها في الدراسة.
- أنا أفهم أن معلومات ابنتي المسجلة في التحقيق ستبقى سرية ولن تتاح للجمهور.
- أوافق على أن تكون ابنتي أحد المشاركين في المشروع.

اسم ولى الامر:	**توقيع ولي الامر:**
التاريخ:	**اسم الطالبة:**

Appendix 9: Consent Form for SID students in English

Title of Research Project: The effect of using universal design for learning (UDL) to improve vocational programmes for students with intellectual disabilities and the challenges facing this method from the point of view of teachers.
Investigator: Ohud Saffar
I am undertaking a study to teach photography by using a teaching method called universal design for learning (UDL). I am asking you to accept working with your friends to learning how you can take an A4 picture. These lessons will help you to learn a profession. If you agree to be in our study, I will ask you to participate in activities that are designed for the whole class twice a week and during art lessons for 30-45 minutes.

Game low	
I am asking you to learn with us about the camera and take pictures. Your parents know about the lessons too.	
If you agree to take pictures with us, we will ask you to come at art lessons.	
I will ask you about how you can take a picture.	
I will ask you about your feelings towards learning a job, and no-one will be upset about your feelings.	
You can ask your school and me any questions at any time.	
You can say 'no' to what we ask you to do to take a picture at any time, and we will stop.	
If you do not want to be in this study and having data collected about you, you can leave the lesson at any time. And please, you should tell me or tell your teacher.	
If you select to stop after we begin, that's okay too.	
If you are happy to participate in this study, sign this paper, it means you have read/ have been told about our lessons, and you want to take part in the study.	
If you don't want to be in the lessons and take part in the study, don't sign the paper. Being in the lessons is up to you, and no-one will be in trouble if you do not want to sign the paper, or if you change your mind later.	

Student's Signature _____ Date _____

Appendix 10: Consent Form for SID students in Arabic

الموافقة على المشاركة في البحث
انا أقوم بهذا الدرس لتعليم والتدريب على التصوير

توقيع الطالبة_____ التاريخ_____

توقيع الباحثة_____ التاريخ _____

	**قوانين اللعبة**
	أنا اريد مساعدتك لأني لا أستطيع استخدام الكاميرا لتصوير.
	أذا كنتي موافقه على تعلم التصوير معنا، مرحبا بك في حصة الفنية.
	سوف نعلم سويا، وأسألك كيف تستطيع استخدام الكاميرا.
	سوف اسالك عن شعورك نحوا تعلم التصوير كمهنة وعمل، ولن يغضب منك أحد إذا كنتي لا تريدين اللعب معنا
	تستطيعين سؤالي أو تسالي مدرستك في أي وقت عن أي سؤال تحتاجينه.
	تستطيعين ان تقولي لا أذا كنتي لا تريدين اللعب معنا لعبة التصوير في أي وقت أنتي تريدين.
	أذا كنتي لا تريدين اللعب معنا وتعلم التصوير تستطيعين أن تذهبي في أي وقت.
	أذا كنتي تريدين التوقف بعد بداية اللعبة، لا مانع وسوف يعلم والديك بذلك.
	أذا كنتي تريدين اللعب معنا، ارجوا توقيع الورقة، وسوف نبدأ تعلم التصوير سوياً
	أذا كنتي لا تريدين اللعب معنا، لا تقومي بتوقيع الورقة، البدء باللعبة سوف يبدأ على حسب رغبتك، ومرحبا بك في أي وقت إذا غيرتي رأيك

Appendix 11: Consent Form for SNSEN students in English

Participant Information Sheet for [students].

Title of the study: The effect of using universal design for learning (UDL) to improve vocational programmes for students with intellectual disabilities and the challenges facing this method from the point of view of teachers.

Introduction

You are invited to participate in a research project as part of my PhD study at the University of Strathclyde, Glasgow. My name is Ohud Saffar, a PhD student at the School of Education.

Contact details:

Email: Ohud.saffar@strath.ac.uk

What is the purpose of this study?

It seeks to achieve the following three goals:

- To investigate the effect of UDL on the learning of photography professional skills for students with intellectual disabilities, compared to students with non-special needs.

- To explain the advantages and drawbacks that are faced by teachers using UDL in vocational programmes for intellectual disabilities students.

- To assess if the UDL is an effective method for integrating intellectually disabled students with non-special needs students in the same classroom, from teachers' perspectives.

** Definition of UDL: The universal design for learning (UDL) method is a comprehensive framework that includes the use of varied means to display lessons, such as a computer and connect the information to the computers so that the learners can see pictures and hear sounds. It also includes multiple ways for students to express understanding of lessons through a list of tasks which a student deems suitable. Finally, it gives students multiple options and helps them integrate as an individual learning or learning in small groups.

Method and demands on participants:

If you choose to participate in this study, you will be invited to join a small photography group comprised of regular students and students with intellectual disabilities. Together, you will train in professional photography throughout the UDL method. The programme's activities have been designed to suit each of the students in the group. You will be participating in the art lessons; each lesson will last 30–45 minutes and will be held twice a week over the course of two to three months. A researcher will observe you during those lessons while you will

train in professional photography throughout the UDL method. During the photography lessons the researcher will write down notes on what they see. The researcher may also ask to copy any planning or photography you do as you create it, you will not be in the photos, just your work. You will also be asked by the researcher and your teacher to take a pre- and post-test for 30 minutes, individually, where the researcher will ask you some questions about using the camera and to take a picture. Some questions you might be asked are: the types of camera, types of photographs, the steps to take a picture and the criteria for taking an image correctly. The implementation of the research project will not your tuition, and your grades will not depend on answering the test questions.

* After the research and training have ended, I will contact the relevant employers in an attempt to find employment for the students with intellectual disabilities in the field of photography.

* After completing the course, all students will receive certificates of attendance.

This programme is voluntary - students do not have to participate in the programme. If you do participate, you may withdraw at any time. If you want to withdraw, please contact me by this email: Ohud.saffar@strath.ac.uk and you should tell your school. If you do not want to participate in this research, you must notify your school. This programme is also anonymous. No names will be recorded or attached to the data.

Why have you been invited to take part?

You have been selected to participate in this study because you are currently a student at a secondary school and mainstream school. This school is connected to the study topic of vocational rehabilitation.

What are the potential risks of taking part in this research?

There are no potential risks to taking part in this research. None of the research methods put the participants under stress or cause social or psychological harm. This research is being conducted because the researchers are interested in questions about vocational training. For further information or to pose questions, please contact your school. If you do not want to participate, please complete the form below and return it to your school.

What happens to the information in the study?

The results will only be made available for analysis under strict confidentiality controls, and will only be used for research purposes. Consent forms will be safely locked in a cabinet at the University of Strathclyde, Glasgow. Each record will be coded to protect participants' identities and will be destroyed after the data have been analysed. Once all the data have been collected, they will be transcribed and translated into English. The results will be anonymous and will be retained by my academic supervisors for five years.

What happens next?

Findings from this study will be published in a thesis and possibly published in educational journals. We will not use your name or that of the school's, yourself and your teacher will not be identified in any part of the research. Thank you for reading this information. Please, do not hesitate to contact the researcher to ask questions if you are unsure about anything that has been outlined here. Email: Ohud.saffar@strath.ac.uk 

Researcher contact details:
If you require further information or have any other questions, please feel free to contact me or my academic supervisor.

Researcher sincerely,

Ohud Saffar, PhD Education

****Contact details of the researcher and the Strathclyde of University, it is like the "Information Letter Ministry of Education"**

Consent Form for [Students]

Name of department: Education

Title of the study: The effect of using universal design for learning (UDL) to improve vocational programmes for students with intellectual disabilities and the challenges facing this method from the point of view of teachers.

- I confirm that I have read and understood the information sheet for the above project and the researcher has answered any queries to my satisfaction.
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences. If I exercise my right to withdraw and I don't want my data to be used, any data which have been collected from me will be destroyed.

- I understand that I can withdraw from the study any personal data (i.e. data which identify me personally) at any time. Also, I should contact the researcher by email: Ohud.saffar@strath.ac.uk and tell my school.
- I understand that anonymised data (i.e. .data which do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the investigation will remain confidential and no information that identifies me will be made publicly available.
- I consent to being a participant in the study.

(Student NAME)	
Signature of Participant:	Date:

Appendix 12: Consent Form for SNSEN students in Arabic

نموذج موافقة الطالبات على تعلم التصوير الفوتوغرافي.

عنوان البحث: أثر استخدام التصميم الشامل في التعلم (UDL) لتحسين نوعية التدريب المهني للمعاقين فكريا والتحديات التي تواجه تطبيق هذه الطريقة من وجهت نظر معلمات التربية الخاصة.

مقدمة:

أنتٍ مدعوة لمشاركة في هذا البحث كجزء من متطلبات دراسة الدكتوراه في جامعة ستراكلايد بجلاسكوا. اسمي عهود سفر طالبة دكتوراه في قسم التربية. البريد الالكتروني: aa_safar@yahoo.com

هدف الدراسة:

يسعى هذا البحث إلى تحقيق الأهداف الثلاثة التالية :

- التحقق من مدى تأثير UDL على تعلم المهارات المهنية والتصوير الفوتوغرافي لطالبات من ذوي الإعاقة الفكرية، مقارنة مع الطالبات من ذوي القدرات العادية.

- شرح مزايا وعيوب التي يواجهها المعلمون باستخدام UDL في برامج التدريب المهني لطالبات من ذوي الإعاقة الفكرية.

- تقييم إذا كان UDL هو وسيلة فعالة لدمج الطالبات من ذوي الإعاقة الفكرية مع الطالبات من ذوي القدرات العادية، من وجهة نظر المعلمات.

سوف يتم تحقيق هذه الاهداف بتقديم ورشة عمل للمعلمين لشرح الخطوات UDL وتدريبهم على كيفية تطبيق هذا الأسلوب لتعليم الطالبات من ذوي الإعاقة الفكرية واقرانهم العاديين من نفس المرحلة. أثناء انعقاد ورشة العمل سوف يتم توزيع استبيان لمعرفة المعيقات التي واجهت المعلمات أثناء التطبيق. وأخيرا، سيتم تقييم فعالية طريقة UDL عن طريق مقارنة نتائج الطالبات اللواتي يدرسن باستخدام برنامج التصميم الشامل مع الطالبات اللواتي يدرسن بطرق المعتادة. وسوف تتكون كل مجموعة من طالبات ذوي اعاقة فكرية وطالبات ذوي القدرات العادية.

دور الطالبة المشاركة في هذه الدراسة:

مدرستك سوف تشارك في مشروع بحثية كتجربة تربوية. إذا اخترتٍ الموافقة على المشاركة في هذه الدراسة، سيتم دعوتك للانضمام الى مجموعة صغيرة تتألف من الطالبات من ذوى الاحتياجات الخاصة ومجموعة من الطالبات من ذوى القدرات العادية. كلتا المجموعتين من الطالبات سوف يتم تدريبهم على مهنة التصوير الفوتوغرافي خلال أسلوب UDL.وسوف تمكن نتائج هذه التجربة الباحثة لتحديد مدى فعالية أسلوب UDL لتحسين البرامج المهنية للطالبات من ذوى الاحتياجات الخاصة مع اقرانهم العاديين. وقد تم تصميم أنشطة البرنامج لتتناسب مع كل الطالبات في المجموعة. وسيشارك جميع الطالبات في نفس الأنشطة خلال حصة الفنية. ومدة كل درس ٣٠-٤٥ دقيقة وسوف تعقد

مرتين في الأسبوع على مدى شهر الى شهرين. مع العلم أن تنفيذ هذا الدراسة البحثية لن تؤثر على الدرجات الدراسية لطالبات. هذا البرنامج هو تطوعي والمشاركة ليست إجباريه. كما انه تستطيعين الانسحاب في أي وقت من الدراسة وبدون أي تكلفة. إذا كنتٍ لا ترغبين في المشاركة في هذا الدراسة، يجب عليكٍ أن تخبري مدرستك بقرارك. واتعهد بأن تكون جميع بيانات الطالبات سريه ومجهولة المصدر بدون معلومات شخصية وسوف تستخدم فقط لتحليل نتائج البحث مع فريق البحث.

* بعد الانتهاء من هذه الدراسة، سوف يحصلن جميع الطالبات المشاركات على شهادات حضور لدورة التصوير الفوتوغرافي.

* سوف يتم اعطاء جميع الطالبات المشاركات شهادة تطوع لإنجاح التجربة لمدة ثلاثة أشهر.

لماذا تم دعوتك للمشاركة في هذه التجربة؟

لقد تم اختيارك للمشاركة في هذه الدراسة لأنكٍ حاليا طالبة في مدارس الدمج الثانوية.

ما هي المخاطر المحتملة لكي عند المشاركة؟

لن يكون هناك اي مخاطر من هذه الدراسة ابدأ. ولتخلص من القلق من كشف الهوية الشخصية للمعلمة او الطالبة، سوف تجعل الباحثة كل الاستبيانات والاوراق والبيانات بأسماء وهميه ومجهولة وسرية. ولضمان الحفاظ على السرية الخاصة بك سوف تقوم الباحثة بتأمين هذه الاوراق في جامعة ستراثكلايد، غلاسكو، المملكة المتحدة. وسيتم مسح الاستبيانات والبيانات البحثية الأخرى بعد تحليل الكامل.

ماذا يحدث للمعلومات أثناء مرحلة الدراسة؟

ستكون هذه البيانات مجهولة وسوف تستخدم فقط لأغراض البحث العلمي. استمارات الموافقة، سيتم ترميز كل رقم قياسي لحماية هويات المشاركين وسيتم التخلص منها بعد تحليل البيانات. وسوف يتم نسخها وترجمتها إلى اللغة الإنجليزية لاستخدامها لأغراض الدراسة. وسيتم الاحتفاظ بهذه البيانات لمدة عامين حتى الحصول على درجة الدكتوراه. وستعرض النتائج في أطروحة الدكتوراه، ويجوز نشر النتائج في التقارير والمجلات الأكاديمية. ومع ذلك، فإن جميع المنشورات المحافظة على السرية وعدم الكشف عن هويته المشاركين في البحث. شكرا لكم على قراءة هذه المعلومات. من فضلك، لا تترددوا في الاتصال بالباحثة لطرح الأسئلة لتأكد من أي نقطة غير مفهومة.

ماذا سوف يحدث بعد ذلك؟

المشاركة في هذه الدراسة هو طوعي تماما، وأنت لست تحت أي التزام لتقديم موافقتك. إذا كنت ترغب بالمشاركة في الدراسة، سوف يطلب منك التوقيع على استمارة الموافقة المرفقة لتأكيد موافقتك.

إذا اخترت تقديم موافقتك، سوف تتلقى نسخة من الأنشطة والخبرات المسجلة المتعلقة بمشاركتكم. وسوف يطلب منك الإذن قبل أن تنقح وتحلل البيانات.

بيانات التواصل:

أذا كنت بحاجة أي سؤال في المستقبل، لا تترددي بالتوصل مع الباحثة او المشرفين الاكاديميين:

****Contact details of the researcher and the Strathclyde of University, it like the "Information Letter Ministry of Education"**

نموذج الموافقة للطالبات المشاركات

القسم: التربية

عنوان البحث: أثر استخدام التصميم الشامل لتعلم لتحسين البرنامج المهني للمعاقين فكريا والتحديات التي تواجه تطبيق هذه الطريقة من وجهت نظر المعلمات.

- اؤكد أنني قد قرأت وفهمت ورقة المعلومات للمشروع المذكور أعلاه والباحث قد أجاب على استفسارات لارتياحي
- أنا أفهم أن مشاركتي طوعية وأنا حر في الانسحاب من المشروع في أي وقت، دون الحاجة إلى إعطاء سبب ودون أية عواقب. إذا مارست حقي في الانسحاب وأنا لا أريد بياناتي أن تستخدم، وسيتم تدمير أية بيانات تم جمعها مني.

- أنا أفهم أنه أستطيع الانسحاب من الدراسة بدون بيانات شخصية في أي وقت.
- أنا أفهم أن بياناتي سوف تكون مجهولة المصدر ولا يمكن كشفها بمجرد أن يتم تضمينها في الدراسة.
- أنا أفهم أن المعلومات المسجلة في التحقيق ستبقى سرية ولن تتاح للجمهور.

- أوافق على أن أكون أحد المشاركين في المشروع

اسم الطالبة:	**توقيع الطالبة:** 
التاريخ:	

Appendix 13: English questionnaire

Supporting professional development among intellectual disability teachers through the implementation of universal design for learning in Saudi Arabia.

Section 1: The current level of implementation of UDL.

For this section of the survey use the following scale:

For each statement, please place a check mark ( ) according to the following rating scale:

SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, and SA= Strongly Agree

Directions: In thinking about your own teaching please identify how often you do the following.

	Engagement	**SD**	**D**	**N**	**A**	**SA**
1	I use lecture as my primary teaching technique.					
2	I encourage students to work in small groups during class.					
3	I offer online assignments.					
4	I encourage students to study as groups outside of class.					
5	I encourage students to communicate online or face -to-face peers to discuss course materials.					
6	I try to design class activities that match to student interests.					
7	I allow students to choose activities that match their interests.					
8	I provide opportunities to build student self-monitoring.					
9	I provide choices for accomplishing course activities in class.					

If you use different methods to engage your student, please indicate below

……
……
……

	Representation	SD	D	N	A	SA
1	I present information in a variety of ways (verbal, visual, auditory, tactile).					
2	I clearly identify the essential concepts in multiple ways so that students understand.					
3	I provide information in alternative formats such as diagrams, charts, graphs or visual concept maps.					
4	I provide a summary of the lesson.					
5	The materials I use are captioned.					
6	I use Digital or Electronic based multimedia books in my teaching.					
7	I offer students access to multimedia resources to support learning.					
8	I encourage students to use online resources and websites to learn class information.					
9	I provide soil ware applications that students can use in their learning.					

If you use different methods to represent your materials, please indicate below

……
……
……..

	Action and Expression	SD	D	N	A	SA
1	I provide multiple types of assignments that include the use of various types of modem media (e.g., written, podcast, presentation, video).					
2	l encourage students to self-monitor their own behavior and learning outcomes.					
3	l encourage students to use technology (e.g. laptops, tablets) in class for learning purposes.					
4	I provide activities for students to demonstrate their knowledge in multiple ways (e.g., writing, presenting, drawing, etc.).					
5	I provide an outline of the steps required for completing the assignments.					
6	I provide models or examples of class projects and assignments.					
7	I allow students to make their own choices in how they complete assignments.					
8	l provide clear guidelines for how to successfully complete all major course assignments.					
9	l clearly identify the scoring methods for all major course assignments before giving the students the assignment.					

If you use different methods of action and expression, please indicate below

……
……
……..

Section 2: Barriers to implementing UDL in classroom

For this section of the survey use the following scale:

For each statement, please place a check mark ( ) that indicates the extent to which you agree or disagree with the statement using the following rating scale:

SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, and SA= Strongly Agree

	Barriers	**SD**	**D**	**N**	**A**	**SA**
1	I don't have understanding of UDL.					
2	I know the basics of UDL but not how to implement it.					
3	I don't have understanding for how to use technology in my classroom.					
4	Lack of overall professional development on new things in education.					
5	There's not enough technology hardware (e.g. laptops, tablets, etc.) in my school.					
6	There's limited access to the Internet in my school.					
7	Technology reduces my contact with students.					
8	My students don't have the necessary technology skills to use it in their own learning.					
9	The use of technology in class is a disruption.					

If there are any other barriers that you can think of please indicate below

……
……

The effect of using universal design for learning (UDL) to improve vocational programme with intellectual disability and challenges facing this method from the point of view of teachers.

Dear Teachers,

The Department of Education at the University of Strathclyde supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

Purpose: The purpose of this questionnaire is to determine the concerns intellectual disability teachers have in adopting Universal Design for Learning (UDL) in their teaching. Moreover, this questionnaire determines teachers' understanding of UDL before and after the training session.

Your participation is completely voluntary. It should take you about 10-20 minutes to complete the questionnaire. This questionnaire is completely confidential.

We thank you in advance!

Section A:

To answer this section, you should choose from 0-7, some items appear to be little relevance or irrelevant to you. For the completely irrelevant items, please circle (0) on the scale. If the items strong relevance, please circle (7) on the scale.

For example:

This statement is very true of me at this time 0 l 2 3 4 5 6 7

This statement is somewhat true of me now 0 I 2 3 4 5 6 7

This statement is not true of me now 0 1 2 3 4 5 6 7

This statement is irrelevant to me 0 I 2 3 4 5 6 7

	Staszes of Concern (CBAM)	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	I am concerned about students' attitudes toward UDL.								
2	I now know of some other approaches that might work better.								
3	I don't even know what the UDL is.								
4	I am concerned about not having enough time to organize myself each day.								
5	I would like to help other teachers in their_ adaptation of UDL.								
6	I have a very limited knowledge about UDL.								
7	I would like to know the effect of reorganization on my professional status								
8	I am concerned about conflict between my interests and my responsibilities								
9	I am concerned about revising mv use of UDL.								
10	I would like to develop working relationships with both our teachers and outside teachers								

	using UDL								
11	I am concerned about how UDL affects students.								
12	I am not concerned about UDL.								
13	I would like to know who will make the decisions in the new system.								
14	I would like to discuss the possibility of using UDL.								
15	I would like to know what resources are available if we decide to adopt UDL.								
16	I am concerned about my inability to manage the requirements Of UDL.								
17	I would like to know how my teaching or administration is supposed to change.								
18	I would like to familiarize other schools or persons with the progress of this new framework.								
19	I am concerned about evaluating my impact on students.								
20	I would like to revise UDL instructional approach.								
21	I am completely occupied with other things.								
22	I would like to modify our use of UDL based on the experiences of our students.								
23	Although I don't know about UDL, I am concerned about things in this area.								
24	I would like to excite my students about their part in this approach.								
25	I am concerned about time spent working with nonacademic problems related to UDL.								
26	I would like to know what the use of the UDL will require in the immediate future.								
27	I would like to coordinate my effort with others to maximize the effects of UDL								
28	I would like to have more information on time and energy commitments required by UDL.								
29	I would like to know what other teachers are doing in this area.								
30	At this time, I am not interested in learning about UDL.								
31	I would like to determine how to supplement, enhance, or repiace UDL								
32	I would like to use feedback from students to change the program								
33	I would like to know how my role will change when I am using UDL								
34	Coordination of tasks and people is taking too much of my time								
35	I would like to know how this UDL is better than what we have now								

Section B: Understanding UDL

To answer this section you should choose from 1-5 based on what you think is the right answer.

1. Universal Design for Learning (UDL) has:

o 1 principle

o 2 principles

o 3 principles

o 4 principles

o 5 major principles

2. The critical elements of UDL:

o Clear Goals and Timely Progress Monitoring

o Clear Goals, Flexible Methods and Materials and Timely Progress Monitoring

o Clear Goals, Intentional Planning for Learner Variability, Flexible Methods and Materials and Timely Progress Monitoring

o Clear Goals

o Timely Progress Monitoring

3. Instructional Planning Process of UDL goes through:

o Establish clear outcomes and anticipate learner variability

o Establish clear outcomes, anticipate learner variability, and measurable outcomes and assessment plan

o Establish clear outcomes, anticipate learner variability, measurable outcomes and assessment plan, and instructional experience

o Establish clear outcomes, anticipate learner variability, measurable outcomes and assessment plan, instructional experience, and reflection and new understandings.

o Establish clear outcomes

4. Recognition Networks is:

o The "why" of learning

o The "how" of learning

o The "what" oflearning

o All

o None of these

5 . Affective Networks is:

- o The "what" oflearning
- o The "how" of learning
- o The "why" oflearning
- o All
- o None of these

6. Strategic Networks

- o The" how" of learning
- o The" why" of learning
- o The "what" of learning
- o All
- o None of these

7. Universal Design for Learning (UDL) is:

- o An approach to teaching
- o A framework used to teach students with/without disabilities
- o A single strategy used to teach students
- o A set of strategies used for students with disabilities
- o A software application for teaching

8. UDL works better for

- o Special education teachers only
- o General education teachers only
- o Both special and general teachers
- o Only for deaf and hard of hearing teachers
- o None of these

9. Learner "variability" refers to:

- o The range of emotions that each learner has toward school and learning
- o The different ethnic and cultural backgrounds oflearners
- o The range of knowledge, skills, and strategies each learner brings to the learning environment
- o All of the above
- o I don't know.

10. Learning goals refer to:

o How we want students to show what they know

o What a teacher wants to change about his or her teaching

o Meet the Ministry of Education Standards or other standards

o What students should know or be able to do by the end of a learning event such as a lesson or unit

o I don't know

11. When using the UDL framework, context is important because:

o The design of the environment and the supports and scaffolds available in the curriculum and instruction impacts a learner's ability to understand, show knowledge, and engage with a learning task

o A teacher can impact how a student feels about the information or skills being taught

o Supports and scaffolds can allow a student to demonstrate a skill that he or she would not have been able to demonstrate on his or her own

o All of the above

o I don't know

12. A learning "context" Includes:

o The environment

o The curricular materials

o Any supports and scaffold in the environment, the curricular materials, or the instruction

o All of the above

o I don't know

13. Affect:

o Distracts from the cognitive tasks demanded by school

o Means enjoying learning

o Includes values, feelings, and emotions; it allows for learning to occur

o Can always be seen on the faces of students in a teacher's classroom

o I don't know

14. The recognition network of the brain:

o Allows us to identify information and categorize what we experience

o Allows us to see, hear, and feel

o Allows us to experience emotions

o Allows us to make a plan for learning

o I don't know

15. My undressing of UDL in general is:

o About design in the classroom environment

o About design in the teaching materials

o About design that deals with student variability

o All of the above

o I don't know

Section C: Demographic information

Gender

o Male

o female

Age……

What type of student they are teaching?

o control group

o experiment group

In your history of teaching have you taught both populations of students?

o Yes

o No

Class level that you teach

o Middle School

o secondary School

Years of experience……

How many years have you been using computers (or tablets) to support your students learning?

……

How many years have you been using the Internet lo support your students learning?

……

Highest level of education you have completed:

o Bachelor's degree

o Graduate

Do you have enough computers to effectively use technology in your teaching?

o Yes

o No

References:

-Alsalem, M. (2015). Considering and Supporting the Implementation of UDL Among Teachers of Students Who Are Deaf and Hard of Hearing in Saudi Arabia.

- CAST (2016) Universal Design for Learning Guidelines 1.0. Wakefield, MA: CAST

Appendix 14: Arabic questionnaire

استبيان(١) يقيس هذا الاستبيان مدى معرفة المعلمات بأسلوب التصميم الشامل لتعلم

القسم الأول: المستوى الحالي للتصميم الشامل للتعلم

الرجاء وضع علامة (√) أمام العبارات التالية التي تناسبك خلال تدريسك وذلك باستخدام المقياس التالي:

١=مطلقا ٢= أحيانا ٣= في كثير من الأوقات ٤=في معظم الأوقات ٥= بشكل يومي

يرجى تحديد مدى استخدامك للأساليب التالية اثناء عملية التدريس:

المشاركة والتفاعل

	العـــبارة	١	٢	٣	٤	٥
١	أستخدم التلقين المباشر كطريقة أساسية في التدريس					
٢	أشجع الطلاب على العمل في مجموعات صغيرة خلال الدرس					
٣	أزود الطلاب بواجبات عن طريق الإنترنت					
٤	أسمح للطلاب باختيار الأنشطة التي تتناسب اهتماماتهم داخل الفصل					
٥	أشجع الطلاب على التواصل عبر الإنترنت أو وجهاً لوجه لمناقشة المواد الدراسية					
٦	أحاول أن أصمم النشاطات الصفية التي تتطابق مع اهتمامات الطلاب					
٧	أشجع الطلاب على الدراسة)المذاكرة) في مجموعات خارج الفصل					
٨	أقوم بتوفير فرص للطلاب لتنمية المراقبة الذاتية لديهم					
٩	أقوم بتقديم خيارات متنوعة لإنجاز الأنشطة داخل الفصل					

إذا كنت تستخدم وسائل مختلفة للطلاب لتشجيعهم على المشاركة والتفاعل من خلال الأنشطة الصفية التي توفرها داخل قاعة الدرس، الرجاء ذكرها هنا:

.....

.....

.....

الفهم والتعبير

	العـــــبارة	١	٢	٣	٤	٥
١	أقوم بتزويد الطلاب بأنواع مختلفة من الواجبات التي تتضمن الوسائل التعليمية الحديثة كالعروض التقديمية ومقاطع الفيديو.					
٢	أشجع الطلاب على المراقبة الذاتية لسلوكياتهم أو تصرفاتهم داخل قاعة الدرس.					
٣	أشجع الطلاب على استخدام التقنية الحديثة (على سبيل المثال اللاب توب، الكمبيوتر) داخل الفصل لغرض التعلم.					
٤	أقوم بتزويد الطلاب بأنواع مختلفة من الأنشطة لإظهار معرفتهم من خلال طرائق متعددة (مثل : الكتابة ،العرض و التقديم، الرسم الخ...)					
٥	أقوم بتزويد الطلاب باجراءات ارشادية لإكمال الواجبات المنزلية					
٦	أقوم بتزويد الطلاب بنماذج أو أمثلة للمشاريع الصفية والواجبات					
٧	أسمح للطلاب لاختيار طريقتهم المناسبة المفضلة في إكمال الواجبات					
٨	أقوم بتزويد الطلاب بتوجيهات واضحة لكيفية إكمال جميع المهام المعطاة لهم بنجاح					
٩	أحدد بوضوح نظام الدرجات لجميع المهام والواجبات قبل إعطائها للطلاب					

إذا كنت تستخدم طرقا مختلفة لطلابك لكي يعبروا عن فهمهم ، الرجاء ذكرها هنا

.....

.....

.....

القسم الثاني: معوقات تطبيق التصميم الشامل للتعلم في الصفوف الدراسية

الرجاء تحديد درجة موافقتك أو عدم موافقتك على العبارات التالية وذلك باستخدام المقياس التالي:

1 = غيرموافق بشدة ، 2=غير موافق ، 3= محايد ، 4= موافق، 5= موافق بشدة

العوائق والحواجز

	العـــبارة	١	٢	٣	٤	٥
١	ليس لدي فهم عن التصميم الشامل للتعلم					
٢	لدي معرفة بأساسيات التصميم الشامل للتعلم لكن ليس لدي المام كاف بكيفية تنفيذه					
٣	ليس لدي معرفة بكيفية استخدام التقنية في الصفوف الدراسية					
٤	لايوجد دورات تدريبية كافية تختص بتقديم المعلومات الحديثة في مجال التعليم					
٥	لايوجد أجهزة كمبيوتر في مدرستي.					
٦	هناك وصول محدود للأنترنت في مدرستي					
٧	استخدام التقنية يقلل من عملية التواصل مع الطلاب					
٨	يفتقر الطلاب الذين اعمل معهم الى مهارات التقنية اللازمة لاستخدامها في تعلمهم					
٩	اعتقد أن استخدام التقنية في الصف الدراسي تؤدي الى ارباك العملية التعليمية					

إذا كان هناك حواجز وعواقب أخرى، الرجاء ذكرها هنا

.....
.....
.....
.....
.....
.....

الاستبيان (٢)

يقيس هذا الاستبيان مدى معرفة تقبل المعلمات لاستخدام التصميم الشامل لتعلم وتحديد العوائق التي تواجهه المعلمات أثناء تطبيق هذه الطريقة.
(UDL)

2017- 2018

لا تنطبق علي مطالقا	لا تنطبق علي في الوقت الحاضر	تنطبق علي بعض الشي	تنطبق علي تماماً الآن
٠	٢ ٣ ١	٤ ٥ ٦	٧

	العـــبارة	٠	١	٢	٣	٤	٥	٦	٧
١	أنا مهتم بمعرفة شعور الطلاب تجاه التصميم الشامل للتعلم								
٢	أعرف حالياً أساليب أخرى قد تعمل بشكل أفضل من التصميم الشامل للتعلم								
٣	ليس لدي معرفة بالتصميم الشامل للتعلم								
٤	أنا قلق لعدم وجود وقت كاف لتنظيم نفسي كل يوم								
٥	أرغب في مساعدة المعلمين الآخرين في تطبيق التصميم الشامل للتعلم								
٦	لدي معرفة محدودة جداً حول التصميم الشامل للتعلم								
٧	أرغب بمعرفة أثر تطبيق التصميم الشامل للتعلم على وضعي المهني								
٨	أنا قلق بخصوص التعارض بين اهتماماتي ومسؤولياتي عندما أطبق التصميم الشامل للتعلم								
٩	أنا مهتم بتعديل تطبيقي للتصميم الشامل للتعلم								
١٠	أرغب في إقامة علاقات عمل مع طاقم التعليم الخاص بنا ومعلمين من خارج المدرسة يستخدمون التصميم الشامل للتعلم								
١١	أنا مهتم لمعرفة التصميم الشامل للتعلمعلى الطلاب								
١٢	أنا غير مهتم بتطبيق التصميم الشامل للتعلم في الوقت الحالي								
١٣	أرغب في معرفة من سيضع القرارات بخصوص تطبيق التصميم الشامل للتعلم								
١٤	أرغب في المناقشة حول كيفية تطبيق التصميم الشامل للتعلم								
١٥	أرغب في معرفة مصادر التعلم المتوفرة في حال تطبيق التصميم الشامل للتعلم								
١٦	أنا قلق لعدم قدرتي على إدارة كل ما يتطلبه تطبيق التصميم الشامل للتعلم								
١٧	التصميم أرغب في معرفة كيف سيتغير تدريسي أو إدارتي في حال تطبيق الشامل للتعلم								
١٨	أرغب في تزويد مدارس أخرى أو معلمين أخرين بمعلومات حول عملية سير هذا التوجه الجديد								
١٩	أنا مهتم في تقييم تأثيري على الطلبة عندما أطبق التصميم الشامل للتعلم								
٢٠	أرغب في تعديل أسلوب تطبيق التصميم الشامل للتعلم								
٢١	أنا مشغول كلياً بأشياء أخرى								
٢٢	أرغب في تعديل تطبيقي للتصميم الشامل للتعلم بنا ءً على خبرات طلابنا								
٢٣	لعدم معرفتي بالتصميم الشامل للتعلم ، فأني قلق حول عدم إلمامي التام ببعض المتطلبات المستقبلية في هذا المجال								
٢٤	أرغب في استثارة طلابي وبث حماسهم حول دورهم عند تطبيق التصميم الشامل للتعلم								

٢٥	أنا قلق بالنسبة للوقت المبذول في العمل مع المشكلات غير التعليمية المتعلقة بتطبيق التصميم الشامل للتعلم								
٢٦	أرغب في معرفة ما سيتطلبه تطبيق التصميم الشامل للتعلم في المستقبل القريب								
٢٧	أرغب في تنسيق جهودي مع الآخرين للحصول على أقصى الفوائد من خلال تطبيق التصميم الشامل للتعلم								
٢٨	أرغب في الحصول على معلومات أكثر حول الوقت والجهد المطلوب لتطبيق التصميم الشامل للتعلم								
٢٩	أرغب في معرفة ما يفعله المعلمون الآخرون في تطبيقهم للتصميم الشامل للتعلم								
٣٠	حالياً أنا غير مهتم بمعرفة معلومات أكثر حول التصميم الشامل للتعلم								
٣١	أرغب في تحديد كيفية إتمام أو تعزيزتطبيق التصميم الشامل للتعلم أو كيفية استبداله بشيء آخر أفضل								
٣٢	أرغب في استخدام التغذية الراجعة من قبل الطلاب لعمل تغييرات على التصميم الشامل للتعلم								
٣٣	أرغب في معرفة كيف سيتغير دوري عندما أستخدم التصميم الشامل للتعلم								
٣٤	تنسيق المهام والأشخاص يأخذ الكثير من وقتي عندما أطبق التصميم الشامل للتعلم								
٣٥	أرغب في معرفة كيف يكون تطبيق التصميم الشامل للتعلم أفضل مما لدينا حاليا								

القسم الثاني: فهم ومعرفة التصميم الشامل للتعلم
للإجابة على هذا القسم يجب أن تختار على ما تعتقد أنه الإجابة الصحيحة.

١. يشتمل التصميم الشامل للتعلم UDL (Universal Design for Learning) على:
- □ مبدأ واحد
- □ مبدئين
- □ ٣ مبادئ
- □ ٤ مبادئ
- □ ٥ مبادئ

٢. تشتمل العناصر الرئيسية للتصميم الشامل للتعلم على:
- □أهداف واضحة و رصد التقدم المستمر
- □أهداف واضحة واستخدام مواد وطرق مرنة و رصد التقدم المستمر
- □أهداف واضحة و معرفة المتغيرات المؤثرة على عملية التعلم واستخدام مواد وطرق مرنة و رصد التقدم المستمر
- □تصميم أهداف واضحة جدا
- □رصد تقدم الطلاب بشكل مستمرودائم

٣. تتضمن عملية التخطيط للدرس من خلال استخدام التصميم الشامل للتعلم على:
- □تحديد نتائج واضحة والتنبؤ بالمتغيرات المؤثرة على عملية التعلم

□تحديد نتائج واضحة والتنبؤ بالمتغيرات المؤثرة على عملية التعلم ووضع أهداف ونتائج قابلة للقياس والتقييم
□تحديد نتائج واضحة والتنبؤ بالمتغيرات المؤثرة على عملية التعلم ووضع أهداف ونتائج قابلة للقياس والتقييم وربط التدريس بخبرات الطلاب وإنشاء بيئة تفاعلية بين الطلاب
□تحديد نتائج واضحة والتنبؤ بالمتغيرات المؤثرة على عملية التعلم ووضع أهداف ونتائج قابلة للقياس والتقييم وربط التدريس بخبرات الطلاب
□تحديد نتائج واضحة هو جوهر التخطيط الفعال للتصميم الشامل للتعلم

٤. شبكة التعرف (**Recognition Networks**) الموجدة بالدماغ تهتم ب:
□هدف التعلم
□كيفية التعلم
□ماهية التعلم
□جميع ماذكر
□لاتوجد إجابة مما ذكر

٥. شبكة الاهتمام وترتيب الأولويات (**Affective Networks**) الموجدة بالدماغ تهتم ب:
□كيفية التعلم
□ماهية التعلم
□هدف التعلم
□جميع ماذكر
□لاتوجد إجابة مما ذكر

٦. شبكة الاستراتجيات والمهارات (**Strategic Networks**) الموجدة بالدماغ تهتم ب:
□هدف التعلم
□ماهية التعلم
□كيفية التعلم
□جميع ماذكر
□لاتوجد إجابة مما ذكر

٧. التصميم الشامل للتعلم عبارة عن:
□طريقة تدريس
□استراتيجية مفردة تستخدم لتعليم وتدريس الطلاب
□إطار تعليمي يستخدم لجميع الطلاب بما فيهم الطلاب ذوي الإعاقة
□مجموعة من الاستراتجيات لتعليم وتدريس الطلاب ذوي الإعاقة
□مجموعة من التطبيقات والبرمجيات لتعليم وتدريس الطلاب

٨. التصميم الشامل للتعلم يعمل بشكل أفضل من خلال:
□معلمي التربية الخاصة فقط
□معلمي التعليم العام فقط
□معلمي التربية الخاصة والتعليم العام
□معلمي الصم وضعاف السمع

□لا أعلم

٩. يشار إلى مصطح المتغيرات:
□مجموعة من المشاعر لكل متعلم تجاه المدرسة والتعلم
□خلفيات وخبرات المتعلم
□مجموعة من المعارف والمهارات و الاستراتجيات لدى كل متعلم بشكل فردي
□كل ما سبق
□فقرة ٢و٣

١٠. يشار إلى أهداف التعلم:
□إظهار المعرفة من قبل الطلاب بأي طريقة
□اختيارأفضل الطرق المناسبة للتدريس من قبل المعلم
□قدرة الطلاب ومهارتهم في إظهار معرفتهم بشكل مستمر ودائم
□تطبيق متطلبات وزارة التربية والتعليم
□لا أعلم

١١. عند استخدام التصميم الشامل للتعلم ، يجب مراعاة:
□دور المعلم على أنه العنصر الأساسي المؤثرعلى الطلاب
□الطالب كمحور الأهتمام الأول
□تصميم البيئة الفصلية، معرفة المتغيرات التعليمية داخل قاعة الدرس، استخدام طرائق تدريس فعالة و إيجاد فرص تفاعلية للطلاب
□كل ما سبق
□لا أعلم

١٢. يقصد بالسياق التعليمي الفعال من خلال التصميم الشامل للتعلم :
□إنشاء بيئة تفاعلية
□إعداد مواد تعليمية فعالة
□إنشاء بيئة تفاعلية ومواد تعليمية متعددة وطرائق تدريس متجددة
□فقرة ١ و ٢
□لا أعلم

١٣. يقصد بالتأثير الفعال:
□العمليات الإدراكية والمعرفية التي يستدخمها الطالب جراء وجود مثير
□التعلم بطريقة ممتعة ومشوقة
□مجموعة من العمليات العلمية المتسلسلة التي تؤثر ايجابياً لإحداث عملية التعلم
□يظهر بشكل واضح وجلي في تعبيرات وسلوكيات الطلاب
□لا أعلم

١٤. شبكة التعرف (Recognition Networks) الموجدة بالدماغ تسمح لنا:
□بتحديد وتصنيف المعلومات

□تحديد المشاعر والسلوكيات
□أن نرى، نسمع، ومعرفة الاحرف ومدلول الكلمات
□بتنظيم وتخطيط المعلومات المستقبلة
□لا أعلم

١٥. معرفتي الحالية بالتصميم الشامل للتعلم هي:
□تصميم البيئة الصفية
□تصميم المواد التعليمية
□تصميم يتناسب ويلائم خصائص طلابي
□كل ما سبق
□لا أعلم

القسم الأخير: المعلومات الشخصية
الجنس:
□ ذكر □ أنثى

العمر: _____
عدد سنوات التدريس: _____

هل أنت مدرس:
□ صم □ ضعاف سمع

خلال تاريخك التدريسي هل قمت بتدريس كلتا الفئتين الصم وضعاف السمع:
□نعم □لا

نوع الفصل الذي تقوم بتدريسه:
□فصل مدمج في مدرسة □معهد للصم

مدرستك الحالية:
□ابتدائية □متوسطة □ثانوية

المؤهلات العلمية:
□بكالوريوس □دراسات عليا

كم عدد السنوات التي استخدمت فيها الحاسب لغرض التعليم: _____

كم عدد السنوات التي استخدمت فيها الإنترنت لغرض التعليم: _____

هل يوجد أجهزة كمبيوتر كافية لاستخدامها بشكل فعال في مدرستك:
□نعم □لا

Appendix 15: Approval to use the questionnaire in this study

سعادة الأستاذة عهود عدنان سفر حفظها الله

السلام عليكم ورحمة الله وبركاته،،،

إشارة إلى خطابك المتضمن استخدام الاستبيان الخاص بتقييم المعوقات المحتملة لاستخدام استراتيجية التصميم الشامل للتعلم والتي تم تصميمها من قبلي في رسالتي للدكتوراه المنشورة في عام 2015 بعنوان: (**Considering and Supporting the Implementation of Universal Design for Learning Among Teachers of Students Who Are Deaf and Hard of Hearing in Saudi Arabia**).

فأنه ليس لدي مانع من استخدام المقياس وكذلك لك كامل الحرية في إضافة أو حذف بعض العبارات حسب ما تقتضيه دراستك، مع مراعاة التوثيق والإشارة للمرجع الأصلي.

مع تمنياتي لك بالتوفيق والسداد،،،

د. ماجد بن عبدالرحمن السالم

استاذ مساعد بقسم التربية الخاصة
جامعة الملك سعود
Majalsalem@ksu.edu.sa

Appendix 16: English Open-questions

The barriers of using the UDL in the vocational programme:

- Can you explain the barriers which you face when using the UDL, as you see it?

A. Physical obstacles.

B. Environmental obstacles.

C. Problems with the students.

D. Problems with the staff.

- What were the factors which reduced the application of UDL in the vocational programme?

The teacher's assessment for using UDL in the vocational programme:

- Do you see the UDL is possible to be an essential programme to train in vocational rehabilitation or to be supplement programme?
- How do you compare UDL with the other teaching approaches you have done during your teaching situation?

The strengths using of UDL:

1) What do you see as the major strengths of UDL for your situation?
2) Do you think that the UDL will help to achieve the principle of the merger?
3) Do you see the UDL is Commensurate with normal students and those with special needs?

The weaknesses using of UDL:

- What weaknesses do you see on the original way you were trained to use UDL programme?
- What do you think, the UDL needs to extra planning time and effort on the part of the teachers?
- Do you believe the teachers need to Intensive training on using the udl?

Looking to the future:

- Would you like to use the UDL strategy to train on photography career? Why? Why not?
- Can you summarize for me where you see yourself right now in relation to the use of UDL for photography career?
- Is there anything else you would like to say?

Appendix 17: Arabic Open-questions

نقاط القوة عند استخدام التصميم الشامل لتعلم(UDL):

1) ماهي نقاط القوة الرئيسية أو الفوائد لاستخدام UDL في عملية التدريس؟

2) هل تعتقد أن استخدام UDL تساعد في تحقيق مبدأ الدمج أو يتناسب مع الطلاب ذوى القدرات العادية وذوي الاحتياجات الخاصة؟ ولماذا؟

نقاط الضعف عند استخدام التصميم الشامل لتعلم(UDL):

- ماهي نقاط الضعف الرئيسية لاستخدام UDL في عملية التدريس؟

- ما رأيك، في استخدام UDL من ناحية التكلفة في الوقت والجهد من جانب التخطيط والتصميم؟

العوائق التي تحد من تطبيق UDL في البرنامج المهني:

- هل يمكن ان توضح العوائق التي تواجهها عند استخدام UDL، من النواحي التالية:

أ. العقبات المادية (مثل التكلفة المالية) .....

ب. العقبات البيئية (مثل المنحدرات، عدم توفر الحاسبات. الخ) .....

ج. المشاكل مع الطلاب (مثل السلوكيات، رفض الوالدين..... الخ).....

د. مشاكل مع العاملين في المدرسة.....

تقييم المعلم لاستخدام UDL في البرنامج المهني:

- هل ترى أن UDL من الممكن استخدامه كبرنامج أساسي لتدريب الطلاب في مجال التأهيل المهني؟ أو أنك ترى أن برنامج ثانوي؟ ولماذا؟
- هل تعتقد أن المعلمين بحاجة إلى تدريب مكثف على كيفية استخدام UDL؟
- ما الفرق بين التدريس المعتاد أو الاستراتيجيات الاخرى والتدريس بطريقة UDL؟

التطلع إلى المستقبل:

١-هل ترغب في استخدام استراتيجية UDL في برنامج التدريب المهني مستقبلا؟ لماذا؟

2- ماهي توصياتك المستقبلية لتحسين استخدام UDL في التدريس؟

3-هل تريد أن تضيف شيء أخر؟

Appendix 18: Answers of Teachers from Arabic to English for Open-questions

Question 1: Do you think that using UDL can help foster inclusion amongst non-special education and students with special needs? Why?

Experimental group		**المجموعة التجريبية**	
The number of teachers	The answers of teachers	إجابة المعلمات	رقم المعلمات
١	Yes, UDL achieves integration into the classroom.	نعم يحقق الدمج في الفصول	١
٢	Yes, UDL achieves integration.	نعم يحقق مبدأ الدمج	٢
٣	Yes, UDL achieves integration.	نعم يحقق الدمج.	٣
٤	Yes, UDL achieves integration through integration the classroom and information.	نعم يحقق مبدا الدمج من خلال دمج الفصول والمعلومات	٤
٥	I agree, UDL achieves integration in the classroom and provide an information.	أوافق يحقق UDL الدمج من ناحية الفصول وتقديم المعلومات.	٥
٦	Yes, UDL achieves	نعم يحقق	٦
٧	Yes, UDL achieves	نعم يحقق	٧
٨	Yes, UDL achieves	نعم يحقق	٨
9	Yes, UDL achieves integration.	نعم يحقق مبدأ الدمج	9
10	Yes, UDL achieves integration.	نعم يحقق مبدأ الدمج	10
11	Yes, UDL achieves integration.	نعم يحقق مبدأ الدمج	11
12	UDL achieves somewhat integration because it is not suitable for all curricula and courses.	يحقق لدمج نوعا لأنه غير مناسب لكل المناهج والمقررات.	12
13	Somewhat UDL achieves integration into a classroom because it is not suitable for teaching science courses such as chemistry, physics ... etc. But it is suitable for courses that need activities.	نوعا ما يحقق UDL الدمج في الفصول، لأنه غير مناسب للمقررات العلمية مثل الكيمياء والفيزياء...الخ. ولكنة مناسب للمقررات التي تحتاج لأنشطة.	13
14	Yes, UDL achieves integration.	نعم يحقق مبدأ الدمج	14
15	Yes, UDL achieves integration.	نعم يحقق مبدأ الدمج	15
16	Yes, UDL achieves integration.	نعم يحقق مبدأ الدمج	16

Question 2: What are the advantages of using UDL in teaching?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	-Create an interactive environment for students by using a variety of teaching and assessment methods. -Useful for integrating students with general education. - Organizing the ideas and knowledge of the teacher.	تهيئة بيئة تفاعلية بين الطلاب عن طريق استخدام طرق متنوعة في التدريس والتقييم. مفيد لدمج الطلاب مع التعليم العام. تنظيم الأفكار والمعارف للمعلم.	١
٢	- Create an interactive environment among students and break the routine and the use of multiple sensory channels. - UDL helps students understand through the use of technology, changing the teaching style and breaking the routine.	تهيئة بيئة تفاعلية بين الطلاب وكسر الروتين واستخدام قنوات حسية متعددة. UDL تساعد الطلاب على الفهم والادراك السريع من خلال استخدام التكنولوجيا وتغيير نمط التدريس وكسر الروتين.	٢
٣	- The UDL achieves integration between students with special needs and general education students.	تحقق الدمج بين الطلاب ذوي الاحتياجات الخاصة والطلاب التعليم العام.	٣
٤	-Using diverse methods of teaching, assessment, flexibility and breaking the routine. - Helps to understand and quick perception.	استخدام طرق متنوعة في التدريس والتقييم والمرونة وكسر الروتين. يساعد على الفهم والادراك السريع.	٤
٥	- Use interesting ways to teach and use cooperative education.	استخدام طرق مشوقة لتعليم واستخدام التعليم التعاوني	٥
٦	-Enhancing the confidence of the integration students. - Use technology, change the teaching style and break the routine, to help students understand the information.	تعزيز الثقة لطالبات الدمج. استخدام التكنولوجيا وتغيير نمط التدريس وكسر الروتين، لمساعدة الطلاب على فهم المعلومات.	٦
٧	- Create an interactive environment among students and use multiple means.	تهيئة بيئة تفاعلية بين الطلاب واستخدام وسائل متعددة	٧

٨	- Helps students to understand rapidly through the use of technology.	يساعد الطلاب على الفهم والادراك السريع من خلال استخدام التكنولوجيا.	٨
Control group		**المجموعة الضابطة**	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
1	Use an interactive environment for students, and use diverse methods of teaching and assessment. -Giving all students the right to education without discrimination.	استخدام بيئة تفاعلية لطلاب، واستخدام طرق متنوعة في التدريس والتقييم. إعطاء جميع الطلاب حقهم في التعليم بدون تمييز.	١
2	-Create an interactive environment for students through the use of diverse methods of teaching, evaluation, flexibility, breaking the routine and the use of multiple sensory channels. -Helps to integrate SID students with the SNSEN in class.	تهيئة بيئة تفاعلية بين الطلاب عن طريق استخدام طرق متنوعة في التدريس والتقييم والمرونة وكسر الروتين واستخدام قنوات حسية متعددة. يساعد على دمج الطلاب المعاقين فكريا مع العاديين في الفصل.	٢
3	-Organizing ideas and knowledge for teacher and student. -Reduce the effort at the teachers.	تنظيم الأفكار والمعارف للمعلم والطالب. تقليل الجهد عند المعلمة.	٣
4	-Creates an interactive environment between SID students and their peers. Also, the flexibility of using multiple sensory channels. -All students learn simultaneously.	تخلق بيئة تفاعلية بين الطلاب المعاقين فكريا واقرانهم. أيضاً، المرونة استخدام قنوات حسية متعددة. جميع الطلاب يتعلمون في وقت واحد.	٤
5	-Useful for integrating students with general education. -Helps the teacher to arrange her ideas and information.	مفيد لدمج الطلاب مع التعليم العام. تساعد المعلم على ترتيب أفكاره والمعلومات.	٥
6	-Using a variety of teaching, evaluation methods and creating an interactive environment suitable for each student.	استخدام طرق متنوعة في التدريس والتقييم وخلق بيئة تفاعلية مناسبة لكل طالب.	٦
7	-Giving all students the right to education without discrimination. -Achieve integration between students.	إعطاء جميع الطلاب حقهم في التعليم بدون تمييز. تحقيق الدمج بين الطلاب.	٧
8	-Create an interactive environment and use multiple sensory channels.	تهيئة بيئة تفاعلية واستخدام قنوات حسية متعددة.	٨

Question 3: What are the disadvantages of using UDL in teaching?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	-Lack of the required means. -Cost in time and effort for the scientific material to be explained.	عدم توفر الوسائل المطلوبة. التكلفة في الوقت والجهد عن المادة العلمية التي سوف تشرح.	١
٢	-Public schools do not provide electronic means.	المدارس الحكومية لا توفر الوسائل الالكترونية.	٢
٣	-Cost in time and effort. -Increase the burden on special education parameters. -Non-interaction of general education teachers with special education teachers to implement the program.	التكلفة في الوقت والجهد. زيادة الأعباء على معلمات التربية الخاصة. عدم تفاعل معلمات التعليم العام مع معلمات التربية الخاصة لتنفيذ البرنامج.	٣
٤	-Expensive physically and you need a long time to design the means and methods required.	مكلفة ماديا وتحتاج الى وقت طويل لتصميم الوسائل والمناهج المطلوبة.	٤
٥	-The lack of all the required means. -Lack of suitable environment for UDL design.	عدم توفر كل الوسائل المطلوبة. عدم توفر البيئة المناسبة لتصميم UDL.	٥
٦	-Lack of the required means in all public schools. -Increasing the burden on teachers of special education. -General education teachers refused to cooperate with special education teachers to implement the program.	عدم توفر الوسائل المطلوبة في جميع المدارس الحكومية. زيادة الأعباء على معلمات التربية الخاصة. رفض معلمات التعليم العام التعاون مع معلمات التربية الخاصة لتنفيذ البرنامج.	٦
٧	-The number of students more than 15 students, which hinders the process of teaching.	عدد الطلاب أكثر من ١٥ طالبة مما يعيق عملية التدريس.	٧
٨	-Difficulty finding all means in public schools, especially electronics.	صعوبة إيجاد جميع الوسائل في المدارس الحكومية، وخاصتا الالكترونيات.	٨

Control group		المجموعة الضابطة	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
1	-This method is difficult to use with scientific materials between SID and SNSEN students.	من الصعب استخدام هذه الطريقة مع المواد العلمية بين العاديين والطلاب المعاقين عقليا.	١
2	-Lack of the required means in all public schools. -The number of female students in the class should be less than 15. -Expensive in time and effort.	عدم توفر الوسائل المطلوبة في جميع المدارس الحكومية. يجب ان يكون عدد الطالبات في الفصل اقل من ١٥. مكلفة في الوقت والجهد.	٢
3	Cost in time, effort and information about the scientific material to be explained.	التكلفة في الوقت والجهد والمعلومات عن المادة العلمية التي سوف تشرح.	٣
4	There is no comment.	لا يوجد تعليق	٤
5	-The UDL method does not benefit from scientific courses to bring together SID and the SNSEN.	لا تنفع طريقة UDL مع المقررات العلمية لجمع بين المعاقين فكريا والعاديين.	٥
6	-Increasing the burden on special education teachers because the general education teachers did not interact with special education teachers to implement the program.	زيادة الأعباء على معلمات التربية الخاصة بسبب عدم تفاعل معلمات التعليم العام مع معلمات التربية الخاصة لتنفيذ البرنامج.	٦
7	-Non-cooperation of public education teachers with special education teachers to make the program a success. -An additional burden on the teacher of special education.	عدم تعاون معلمات التعليم العام مع معلمات التربية الخاصة لإنجاح البرنامج. يعد عبئ إضافي على معلمة التربية الخاصة.	٧
8	-Difficulty finding the required means in public schools. -The number of female students in the class should be less than 15	صعوبة إيجاد الوسائل المطلوبة في المدارس الحكومية. يجب ان يكون عدد الطالبات في الفصل اقل من ١٥	٨

Question 4: What is your opinion about using UDL with respect to cost, time spent, and efforts exerted during planning and designing?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	-The financial cost and time are very high. -UDL needs a long time to implement.	تعد التكلفة المالية والوقت عالية جدا. تحتاج الى وقت طويل لتنفيذه.	١
٢	Expensive in time and effort.	مكلفة فى الوقت والجهد.	٢
٣	Very expensive because they need a long time to carry it.	مكلفة جدا لأنها تحتاج الى وقت طويل لتنفيذه.	٣
٤	The financial cost and time are very high.	تعد التكلفة المالية والوقت عالية جدا.	٤
٥	The financial cost and time are very high.	تعد التكلفة المالية والوقت عالية جدا.	٥
٦	-Expensive in time and effort. But it provides the teacher with the effort to communicate the idea to all students and to take into account the individual differences.	مكلفة في الجهد والوقت. ولكنها توفر على المعلم الجهد في توصيل الفكرة لجميع الطلاب العام والخاص ومراعاة الفروق الفردية.	٦
٧	-You need a long time to implement it. - The financial cost and time are very high.	تعد التكلفة المالية والوقت عالية جدا. تحتاج الى وقت طويل لتنفيذه	٧
٨	The financial cost and time are very high.	تعد التكلفة المالية والوقت عالية جدا.	٨
1	-UDL needs a long time to implement. -Suitable for general and private education students.	تحتاج الى وقت طويل لتنفيذه. مناسبة للطالبات التعليم العام والخاص.	١
2	-The financial cost and time are very high	تعد التكلفة المالية والوقت عالية جدا	٢
3	-UDL needs a long time to execute and design program. It also needs a long-time teacher to implement the program. -A good idea and must be adopted by the ministry	تحتاج الى وقت طويل لتنفيذه وتصميم برنامج UDL. كما انها تحتاج من المعلم وقت طويل لتنفيذ البرنامج. فكرة جيدة ويجب ان تتبنها الوزارة	٣

Control group	المجموعة الضابطة	Control group	المجموعة الضابطة
4	-Prepare financially and in time. -UDL need a long time to implement it	تعد مكلفة ماليا وفي الوقت. تحتاج الى وقت طويل لتنفيذه	٤
5	The financial cost and time are very high.	تعد التكلفة المالية والوقت عالية جدا	٥
6	-Expensive and need very high voltage. -You need a long time to implement it. -Excellent but not with all materials.	مكلفة وتحتاج جهد عالي جدا. تحتاج الى وقت طويل لتنفيذه. ممتازة ولكن ليس مع كل المواد.	٦
7	- There is no comment.	لا يوجد تعليق.	٧
8	-The financial cost and time is very high because it takes a long time to implement and prepare the means.	تعد التكلفة المالية والوقت عالية جدا لأنها تحتاج الى وقت طويل لتنفيذه واعداد الوسائل.	٨

Question 5: Can you explain the challenges and obstacles that you face when using UDL in teaching:

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	-High cost. -There are financial obstacles in terms of lack of maintenance of modern computers in government buildings. -Lack of smart devices in the school to help implement the program. -There are no problems with students. -There is no cooperation with the general education teachers in the school.	التكلفة عالية. هناك عوائق مادية من ناحية عدم توفر صيانة لحواسب الحديثة في المباني الحكومية. عدم توفر أجهزة ذكية في المدرسة تساعد على تنفيذ البرنامج. لا يوجد أي مشاكل مع الطلاب. لا يوجد تعاون مع معلمات التعليم العام في المدرسة.	١
٢	-High cost. -There are no problems with students. -There are no problems with employees within the school.	التكلفة عالية. لا يوجد أي مشاكل مع الطلاب. لا يوجد مشاكل مع العاملين داخل المدرسة.	٢
٣	-There are no obstacles. -There are no problems between students and school workers, but there are problems between teachers of public and private education.	لا يوجد عوائق. لا يوجد أي مشاكل بين الطلاب ولا العاملين في المدرسة، ولكن يوجد مشاكل بين معلمات التعليم العام والخاص.	٣
٤	-Lack of maintenance of modern computers in government buildings. -Lack of electronic means in schools. -There is no cooperation in some situations between ordinary students and students with special needs. -Also, there is no collaboration between public and private education teachers within the school.	عدم توفر صيانة لحواسب الحديثة في المباني الحكومية. عدم توفر وسائل إليكترونية في المدارس. لا يوجد تعاون في بعض المواقف بين طلاب العاديين والطلاب ذوي الاحتياجات الخاصة. أيضا، لا يوجد تعاون بين معلمين التعليم العام والخاص داخل المدرسة.	٤

Control group	المجموعة الضابطة	Control group	المجموعة الضابطة
٥	-High cost. -There are financial obstacles in terms of lack of maintenance of modern computers in government buildings. -Lack of smart devices in the school to help implement the program. -There are no problems with students. -Lack of cooperation with teachers of general education and school workers.	التكلفة عالية. هناك عوائق مادية من ناحية عدم توفر صيانة لحواسب الحديثة في المباني الحكومية. عدم توفر أجهزة ذكية في المدرسة تساعد على تنفيذ البرنامج. لايوجد أي مشاكل مع الطلاب. قد لا نجد تعاون مع معلمات التعليم العام والعملين في المدرسة.	٥
٦	-Sometimes there is no cooperation between female students with normal abilities.	بعض الأحيان لا يكون هناك تعاون بين الطالبات من ذوى القدرات العادية.	٦
٧	-High cost. -There are financial obstacles in terms of lack of maintenance of modern computers in government buildings. -The lack of smart devices in the school to help implement the program. - There are no problems with students or employees within the school.	التكلفة عالية. هناك عوائق مادية من ناحية عدم توفر صيانة لحواسب الحديثة في المباني الحكومية. وعدم توفر أجهزة ذكية في المدرسة تساعد على تنفيذ البرنامج. لا يوجد أي مشاكل مع الطلاب ولا العاملين داخل المدرسة.	٧
٨	There are no obstacles. -There are no problems with students. - There are no problems among the school staff.	لا يوجد عوائق. لايوجد أي مشاكل مع الطلاب. لايوجد مشاكل بين العاملين في المدرسة.	٨
9	-There are no problems with students and parents because of sufficient awareness. -There are no problems with the workers of the administration and teachers.	لا يوجد أي مشاكل مع الطلاب والأهالي بسبب توفر الوعي الكافي. لا يوجد مشاكل مع العاملين من ادرة ومعلمين.	9
10	-Facing problems with parents of students of general education in terms of refusing to teach their daughters with students with special needs. -Some teachers of public education refuse to cooperate	مواجهه مشاكل مع أهالي طالبات التعليم العام من ناحية رفض تدريس بناتهم مع الطلاب ذوي الاحتياجات الخاصة. بعض معلمين التعليم العام يرفضون التعاون مع معلمات التعليم الخاص ويعتبرون ذلك عبئ.	10

	with special education teachers and consider it a burden.		
11	-Some parents of private education students refuse to cooperate with their daughters in solving the duties of the computer or social programs for not knowing the technology. -General education teachers refused to help special education teachers.	بعض أهالي الطالبات التعليم الخاص يرفضون التعاون مع بناتهم في حل واجبات الخاصة بالحاسب او برامج الاجتماعية لعدم معرفتهم بتقنية. رفض معلمين التعليم العام مساعدة معلمين التعليم الخاص.	11
12	- There are no problems with students and parents.	لا يوجد أي مشاكل مع الطلاب والاهالي.	12
13	-Consideration of inferiority for students of special education	النظر بدونية لطلاب التربية الخاصة	13
14	-There are no problems with employees within the school.	لا يوجد مشاكل مع العاملين داخل المدرسة.	14
15	-There should be deterrence from leaders and administrations. -There is no cooperation between teachers of special education and public education.	يكون هناك ردع من القادة والإدارات. لا يوجد تعاون بين معلمين التربية الخاصة والتعليم العام.	15
16	There may be no collaboration with general education teachers.	قد لا نجد تعاون مع معلمات التعليم العام.	16

Question 6: Do you feel that UDL can be used as a basic program for training students in the field of vocational habilitation? Or do you consider it an auxiliary one? Why?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	-Yes, it can be used as a basic program because it uses multiple means suitable for all students. -A program that helps renewal and innovation. -Flexible program.	نعم، يمكن استخدامه كالبرنامج أساسي لأنه يستخدم وسائل متعددة تناسب جميع الطلاب. برنامج يساعد على التجديد والابتكار. برنامج مرن.	١
٢	-Yes, it can be used as a Basic program.	نعم، يمكن استخدامه كالبرنامج أساسي.	٢
٣	-It can be used as a basic approach in the school to diversify the use of means. And if the appropriate environment, money and appropriate preparation for students. It is used for innovation and innovation in subjects that attract the attention of female students.	يمكن استخدامه كمنهج أساسي في المدرسة لتنوع استخدام الوسائل. وإذا توفرت البيئة المناسبة والمال والاعداد المناسبة لطلاب. يستخدم لما فيه من ابتكار وتجديد في المواضيع والتي تشد من انتباه الطالبات.	٣
٤	-Yes, it can be used because it is suitable for all students and it helps to innovation.	نعم، من الممكن استخدامه لأنه يتناسب مع جميع الطلاب. وبه ابتكار وتجديد.	٤
٥	-Yes it can be used as a basic program because it is suitable, wonderful and to diversify the methods of knowledge through it. It also attracts students' attention.	نعم يمكن استخدامه كالبرنامج أساسي لأنه مناسب ورائع ولتنوع أساليب المعرفة من خلاله. كما يشد انتباه الطلاب.	٥
٦	-It can be used because it is a very cool program that integrates SID and SNSEN students. Because it uses multiple ways to convey information and attract students' attention in new ways.	يمكن استخدامه لأنه برنامج رائع جدا ويحقق الدمج بين الطلاب المعاقين وغير المعاقين. لأنه يستخدم طرق متعددة لإيصال المعلومات وجذب انتباه الطلاب بطرق مجددة.	٦
٧	-Yes, it can be used as a Basic program.	نعم، يمكن استخدامه كالبرنامج أساسي.	٧
٨	-Yes it can be used as a basic program. Because it is flexible and suitable for all students.	نعم يمكن استخدامه كالبرنامج أساسي. لأنه برنامج مرن ومناسب لجميع الطلاب.	٨

Control group		المجموعة الضابطة	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
1	Yes, it can be used as a basic program because it is suitable and wonderful. The diversity of knowledge methods through it	نعم يمكن استخدامه كالبرنامج أساسي لأنه مناسب ورائع. لتنوع أساليب المعرفة من خلاله	١
2	It is not useful to use a basic program, but it is used as a secondary program because it needs more time and definition. It also needs the cooperation of all school staff.	لا ينفع ان يستخدم برنامج أساسي بل يستخدم كبرنامج ثانوي لأنه يحتاج وقت وتعريف أكثر. كما يحتاج لتعاون جميع العاملين في المدرسة.	٢
3	Yes, it can be used as a basic program because it is suitable and wonderful. The diversity of knowledge methods through it	نعم يمكن استخدامه كالبرنامج أساسي لأنه مناسب ورائع. لتنوع أساليب المعرفة من خلاله	٣
4	A secondary program needs more time and definition for the cooperation of all school staff.	برنامج ثانوي يحتاج وقت وتعريف أكثر لتعاون جميع العاملين في المدرسة.	٤
5	Yes, it can be used as a basic program because it is suitable and wonderful. The diversity of knowledge methods through it	نعم يمكن استخدامه كالبرنامج أساسي لأنه مناسب ورائع. ولتنوع أساليب المعرفة من خلاله	٥
6	Yes, it can be used as a basic program because it is suitable and wonderful, because it is flexible and suitable for the abilities of students.	نعم يمكن استخدامه كالبرنامج أساسي لأنه مناسب ورائع، لأنه مرن ومناسب لقدرات الطلاب.	٦
7	Yes, it can be used as a basic program because it is suitable and wonderful.	نعم يمكن استخدامه كالبرنامج أساسي لأنه مناسب ورائع	٧
8	Yes, it can be used as a basic program because it is suitable and wonderful.	نعم يمكن استخدامه كالبرنامج أساسي لأنه مناسب ورائع	٨

Question 7: Do you think teachers must be intensively trained on how to use UDL?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	Yes, the teachers need training because the practice needs to be practical rather than theoretical through the preparation of workshops and the exchange of experiences.	نعم، تحتاج المعلمات الى تدريب لان الممارسة تحتاج الى تطبيق عملي وليس نظري من خلال اعداد ورشات عمل وتبادل الخبرات.	١
٢	Yes, teachers need intensive training on how to use UDL.	نعم يحتاج المعلمين الى تدريب مكثف على كيفية استخدام برنامج UDL.	٢
٣	Yes, teachers need practical training to a long time.	يحتاج المعلمين الى تدريب عملي لمدة طويلة.	٣
٤	Teachers need intensive training, practical and not theoretical training.	يحتاج المعلمين الى تدريب مكثف، تدريب عملي وليس نظري.	٤
٥	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	٥
٦	Yes, UDL does not need intensive training by presenting workshops and sharing experiences.	نعم يحتاج الى تدريب مكثف من خلال عرض ورشات عمل وتبادل الخبرات.	٦
٧	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب.	٧
٨	Yes, UDL does not need intensive training by presenting workshops and sharing experiences.	نعم يحتاج الى تدريب مكثف من خلال عرض ورشات عمل وتبادل الخبرات.	٨
9	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	9
10	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	10
11	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	11
12	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	12
13	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	13
14	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	14
15	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	15
16	Yes, teachers need practical training.	نعم يحتاج المعلمين الى تدريب عملي.	16

Question 8: What is the difference between normal teaching strategies and UDL?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	-There is a huge difference in terms of teaching methods and methods of presentation of information. Because the usual teaching is routine and tedious. -There is a difference in information communication and consolidation of information in a fun and more flexible. -A method that helps the teacher to organize information and communicate the information in a variety of ways.	هناك فرق كبير من ناحية وسائل التدريس وطرق عرض المعلومات. لان التدريس المعتاد يكون روتيني وملل. هناك فرق في توصيل المعلومات وترسيخ للمعلومات بشكل ممتع وأكثر مرونة. طريقة تساعد المعلم على تنظيم المعلومات وتوصيل المعلومات بعدده طرق.	١
٢	- Usual teaching is tedious either UDL program uses multiple means. -In the usual teacher teaching is the focus of teaching, but in the overall design to teach the student the total freedom to choose the learning method and teacher guidance cycle only. -UDL achieves the principle of integration.	التدريس المعتاد يكون ملل اما برنامج UDL يستخدم وسائل متعددة. في التدريس المعتاد المعلم هو محور التدريس، ولكن في التصميم الشامل لتعلم لطالب الحرية التامة في اختيار طريقة التعلم والمعلم دورة التوجيه فقط. تحقق مبدا الدمج.	٢
٣	-The usual instruction will be boring either the UDL program uses multiple means. -The difference between the usual teaching and UDL is that the teacher's routing course only. In the usual teaching teacher imposes orders.	التدريس المعتاد يكون ملل اما برنامج UDL يستخدم وسائل متعددة. الفرق بين في التدريس المعتاد وUDL هو ان المعلم دورة التوجيه فقط. اما في التدريس المعتاد المعلم يفرض الأوامر.	٣
٤	-UDL helps to communicate information in a way that is	UDL تساعد على توصيل المعلومات بطريقة ممتعة بعكس الطرق المعتادة.	٤

	enjoyable unlike the usual methods.		
٥	-The usual teaching is boring either the UDL program uses multiple methods. -The teacher in the usual teaching does everything related to the student either in UDL student is the one who chooses the activities and methods of education that he wants.	التدريس المعتاد يكون ملل اما برنامج UDL يستخدم وسائل متعددة. المعلم في التدريس المعتاد يقوم بكل شيء يخص الطالب اما في UDL الطالب هو الذي يختار الأنشطة وطرق التعليم التي يريدها.	٥
٦	-Consolidate information more reliably and more flexibly in UDL than standard programs.	ترسيخ المعلومات بشكل ممتع وأكثر مرونة في UDL أكثر من البرامج المعتادة.	٦
٧	-Usual teaching is tedious either UDL program uses multiple means. -In the UDL, the teacher directs the student and does not interfere with anything, unlike the usual teaching. -UDL achieve the integration principle	التدريس المعتاد يكون ملل اما برنامج UDL يستخدم وسائل متعددة. المعلم في UDL يوجه الطالب ولا يتدخل في أي شيء بعكس التدريس المعتاد. تحقق مبدا الدمج	٧
٨	-Usual teaching is tedious either UDL program uses multiple means. -UDL helps to achieve the principle of integration. -Organized and comprehensive way and facilitates the communication of information.	التدريس المعتاد يكون ملل اما برنامج UDL يستخدم وسائل متعددة. تحقق مبدا الدمج. منظمة وشاملة وأسهل في توصيل المعلومات.	٨
9	-There is a big difference in terms of teaching methods and presentation of information. Because the usual teaching is routine and unhelpful. -Organized and comprehensive information.	هناك فرق كبير من ناحية وسائل التدريس وطرق عرض المعلومات. لان التدريس المعتاد يكون روتيني وملل. منظمة وشاملة للمعلومات.	9
10	-Flexible and fun.	مرنة وممتعة.	10
11	-The main difference is that UDL uses multiple teaching methods and methods, not a routine method.	فرق الأساسي هو ان UDL تستخدم وسائل وطرق تدريس متعددة وليست طريقة روتينية.	11
12	-Flexible and fun. - UDL helps to achieve the principle of integration.	مرنة وممتعة. تحقق الدمج.	12

Control group	المجموعة الضابطة	Control group	المجموعة الضابطة
13	-The usual routine method does not use multiple methods of teaching.	الطريقة المعتادة روتينية ولا تستخدم طرق متعددة لتدريس.	13
14	-There is a clear difference in terms of teaching methods and methods of presentation of information. Because the usual teaching is routine and tedious. -Flexible and attractive and fun way.	هناك فرق كبير من ناحية وسائل التدريس وطرق عرض المعلومات. لان التدريس المعتاد يكون روتيني وملل. مرنة وطريقة جذابة وممتعة.	14
15	- UDL helps to achieve the integration. -Benefit for all levels and suitable for individual differences.	تحقق الدمج. تنفع لكل المستويات ومناسبة للفروق الفردية.	15
16	-Usual teaching is very boring and routine and relies on limited and refined means. -It is flexible in communicating information and avoiding routine.	التدريس المعتاد ممل جدا وروتيني ويعتمد على وسائل محدودة ومكرره. تتميز بالمرونة في توصيل المعلومات والابتعاد عن الروتين.	16

Question 8: Do you look forward to using UDL in the future? Why?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	Yes, I want to use the method again because it is a fun way and the results are wonderful for female students.	نعم، اريد استخدام الطريقة مره أخرى لأنها طريقة ممتعة ولان النتائج رائعة على الطالبات.	١
٢	Yes, I want to use UDL in the future. Because it is a method that achieved integration and an organized way.	نعم، اريد استخدام UDL في المستقبل. لأنها طريقة حققت الدمج وطريقة منظمة.	٢
٣	Yes, I want to use this program in the future because UDL is a great way.	نعم، اريد استخدام هذا البرنامج في المستقبل لان UDL طريقة رائعة.	٣
٤	I definitely want to use UDL again because it helped the students communicate the information.	بالتأكيد اريد استخدام UDL مره أخرى لأنها ساعدت الطالبات في توصيل المعلومات.	٤
٥	Yes, I want to use the method again because it is a fun way and the results are wonderful for female students.	نعم، اريد استخدام الطريقة مره أخرى لأنها طريقة ممتعة ولان النتائج رائعة على الطالبات.	٥
٦	Yes, I want to use UDL again.	نعم، اريد استخدام UDLمره أخرى.	٦
٧	Yes, I want to use this program in the future because UDL is a great way.	نعم، اريد استخدام هذا البرنامج في المستقبل لان UDL طريقة رائعة.	٧
٨	Yes, I want to use UDL again.	نعم، اريد استخدام UDL مره أخرى.	٨
9	-I want to use it but not for now. But after adequate training of teachers because of the lack of adequate technological means.	أريد ان استخدمها ولكن ليس في الوقت الحالي. ولكن بعد تدريب الكافي للمعلمات وذلك بسبب عدم توفير الوسائل التكنولوجية الكافية.	9
10	Yes, I want to use the method again because it is a fun way and the results are wonderful for female students.	نعم، أريد استخدام الطريقة مره أخرى لأنها طريقة ممتعة ولان النتائج رائعة على الطالبات.	10
11	Yes, I want to use UDL again	نعم، أريد استخدام الطريقة مره أخرى.	11

Control group	المجموعة الضابطة	Control group	المجموعة الضابطة
1	Yes, I want to use the method again because it is a fun way and the results are wonderful for female students.	نعم، أريد استخدام الطريقة مره أخرى. لأنها طريقة ممتعة ومرنة مع الطالبات.	1
2	-Yes, I want to use UDL again. It helps students to learn the fun.	نعم، أريد استخدام UDL مره اخرى. لأنها تساعد الطلاب على التعلم بشكل ممتع.	2
3	-I want to use it not now, but after training teachers and provide adequate technological means.	اريد ان استخدمها ليس الان ولكن بعد تدريب المعلمات وتوفير الوسائل التكنولوجية الكافية.	3
4	-Yes, I want to use UDL in the future. Because it is an organized and new way.	نعم، أريد استخدام UDL في المستقبل. لانها طريقة منظمة وجديدة.	4
5	-Yes, I want to use UDL in the future.	نعم، أريد استخدام UDL في المستقبل.	5

Question 9: What are your future recommendations to improve the use of UDL in teaching?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	-Cooperation between the Ministry and the teacher and cooperation between the teacher and the leader and all the organizers. -Raise the efficiency of teachers through training courses in this field. -The ministry should adopt the cost of designing the programs. -preparing the teachers and the classroom environment.	التعاون بين الوزارة والمعلم والتعاون بين المعلم والقائد وجميع الجهات المنظمة. رفع كفاءة المعلمات من خلال الدورات التدريبية في هذا المجال. ان تتبني الوزارة التكلفة لتصميم البرامج. تهيئة المعلمات والبيئة الصفية.	١
٢	No comment	لا يوجد تعليق.	٢
٣	-The ministry should adopt the cost to design the programs. -Teacher preparation and classroom environment. -Raise the efficiency of teachers through training courses in this field.	ان تتبني الوزارة التكلفة لتصميم البرامج. تهيئة المعلمات والبيئة الصفية. رفع كفاءة المعلمات من خلال الدورات التدريبية في هذا المجال.	٣
٤	No comment	لا يوجد تعليق.	٤
٥	-Raise the efficiency of teachers through training courses in this field. -Cooperation between the Ministry and the teacher and cooperation between the teacher and the leader and all the organizers.	رفع كفاءة المعلمات من خلال الدورات التدريبية في هذا المجال. التعاون بين الوزارة والمعلم والتعاون بين المعلم والقائد وجميع الجهات المنظمة.	٥
٦	-The ministry should adopt the cost to design the programs. -Teacher preparation and classroom environment.	ان تتبني الوزارة التكلفة لتصميم البرامج. تهيئة المعلمات والبيئة الصفية.	٦
٧	-Raise the efficiency of teachers through training courses in this field.	رفع كفاءة المعلمات من خلال الدورات التدريبية في هذا المجال.	٧

٨	-Raise the efficiency of teachers through training courses in this field.	رفع كفاءة المعلمات من خلال الدورات التدريبية في هذا المجال.	٨
Control group		**المجموعة الضابطة**	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
1	No comment	لا يوجد تعليق.	١
2	- Cooperation between the Ministry of Education and the teacher. Also, cooperation between the teacher and the leader and all the organizers.	التعاون بين وزارة التعليم والمعلم. والتعاون بين المعلم والقائد وجميع الجهات المنظمة.	٢
3	-Cooperation between the teacher and the leader and all the organizers and Ministry.	التعاون بين المعلم والقائد وجميع الجهات المنظمة والوزارات.	٣
4	-Cooperation between the Ministry of Education and the teacher. Also, cooperation between the teacher and the leader and all the organizers.	التعاون بين الوزارة والمعلم والتعاون بين المعلم والقائد وجميع الجهات المنظمة.	٤
5	-The ministry should adopt the cost to design the programs. -Teacher preparation and classroom environment.	ان تتبني الوزارة التكلفة لتصميم البرامج. تهيئة المعلمات والبيئة الصفية.	٥
6	No comment.	لا يوجد تعليق.	٦
7	-The ministry should adopt the cost to design the programs.	ان تتبني الوزارة التكلفة لتصميم البرامج	٧
8	-The ministry should adopt the cost to design the UDL programs.	ان تتبني الوزارة تكلفة تصميم برنامج UDL.	٨

Question 10: Would you like to add any other opinions?

Experimental group		المجموعة التجريبية	
The number of teachers	**The answers of teachers**	**إجابة المعلمات**	**رقم المعلمات**
١	I do not want to add anything.	لا نريد إضافة شيء	١
٢	Thank you for the researcher and for her efforts and the pleasure of doing the experiment and happiness from the results of this experience.	شكرا للباحثة ولجهودها والسرور من عمل التجربة والسعادة من نتائج هذي التجربة.	٢
٣	I do not want to add anything.	لا نريد إضافة شيء	٣
٤	Thank you for the researcher and for her efforts. Also, we are happiness from the results of this experience.	شكرا للباحثة على عمل التجربة ونحن سعيدين من نتائج هذي التجربة.	٤
٥	Thank you for the researcher efforts.	شكرا للباحثة ولجهودها.	٥
٦	I do not want to add anything.	لا نريد إضافة شيء	٦
٧	Thank you to the researcher and happiness of the results of this experience.	شكرا للباحثة والسعادة من نتائج هذي التجربة.	٧
٨	I wish to expand UDL teaching in a thoughtful, organized and inexpensive way for the teacher.	اتمني التوسع في التدريس بطريقة UDL بطريقة مدروسة ومنظمة وغير مكلفة على المعلم.	٨
9	I do not want to add anything.	لا نريد إضافة شيء.	9
10	Thank you for the researcher efforts to prepare this experience.	شكرا للباحثة على جهودها لأعداد هذه التجربة.	10
11	Thanks, and appreciation to the researcher for her efforts.	شكرا وتقدير للباحثة على مجهودها.	11
12	I do not want to add anything.	لا نريد إضافة شيء.	12
13	I do not want to add anything.	لا نريد إضافة شيء.	13
14	I do not want to add anything.	لا نريد إضافة شيء.	14
15	Thanks to the researcher for the valuable information provided.	شكر للباحثة على المعلومات القيمة المقدمة.	15
16	Thanks to the researcher for honesty and sincerity in work. Also, she provide everything that is new to us.	شكر للباحثة على الأمانة والإخلاص في العمل. وتقديم كل ما هو جديد لنا.	16

Appendix 19: Application of observation (The Principles of UDL) in English.

The aim of using this application of observation is to measure the three principles of UDL during the lessons. The first principle is to present multiple means of representation: what will students learn? The second principle is to provide multiple means of action and expression: how will students learn? The third principle is to give multiple means of engagement: why will students learn? Additionally, this list proposes to confirm that the teacher will apply the principles of UDL correctly. UDL principles will be explained in detail to teachers in the workshop, which will be held before the application of the experimental study.

Instructions for use:

First, the observer must fill in general information about the classroom and the subject of the lesson. For a table or chart, the horizontal line represents the number of sessions or the number of days to apply lessons. Conversely, the vertical line represents the application steps of UDL.

To gauge the extent to which the principles of UDL have been applied, the observer must put a check mark (✓) in front of each item that has been achieved in each session or lesson. If the item has not been achieved, the observer should put an 'X'. This list will help to amend the teacher's mistakes in his or her application of the UDL principles.

Application of observation (The Principles of UDL).

The Class room: **Teachers' name:**

The title of lesson: **The lesson:**

Place a checkmark (✓) if you achieved a goal in the lesson, put the wrong sign (X) if you did not achieve the target.

The Three Principles of UDL	**Lessons**					
1. Provide Multiple Means of Representation:	1	2	3	4	5	6
Using a variety ways to present information (verbal, visual, auditory, tactile)						
Using multiple of ways to identify the essential concepts to help students understand.						
Providing information in alternative formats such as diagrams, graphs... etc.						
Summarizing of the lesson						
Using the captions, as materials						
Using the digital or e-books based multimedia in teaching.						
Providing students access to multimedia resources to support learning.						
The students use online resources and websites to learn class information.						
The students can use software applications for learning						
2.Provide Multiple Means of Action and Expression						
Using the lecture as my primary teaching technique.						
The students work in small groups during lesson						
Using online assignments						
The students study as groups outside of class						

Communication with student by online or face-to-face peers to discuss about the topic						
Designing class activities which match to student interests						
The students choose activities which match their interests						
The students depend on self-monitoring for their self						
The students choose between multi activities to accomplish tasks in class.						
3.Provide Multiple Means of Engagement						
Providing multiple types of assignments, such as written, podcast and presentation video.						
The student assesses their self-monitoring behaviour and learning outcomes.						
The student use technology (e.g., laptops, tablets…..etc.)						
Providing multiple activities for students to show their knowledge.						
Providing an outline of the steps required for completing the tasks.						
Providing models or example of class lessons and tasks.						
The students complete tasks according to their choices.						
Providing clear guidelines to successfully complete all major tasks.						
Identifying the scoring methods for all the main tasks before giving the students the tasks.						

References:

- Alsalem, M. (2015). Considering and Supporting the Implementation of UDL Among Teachers of Students Who Are Deaf and Hard of Hearing in Saudi Arabia.
- CAST (2011). Universal Design for Learning Guidelines version 2.0. Wakefield, MA: Author.

Appendix 20: Application of observation (The Principles of UDL) in Arabic.

الهدف من استخدام هذه الاستمارة للملاحظة هو قياس المبادئ الثلاثة ل UDLخلال عرض الدروس في الفصل الدراسي. المبدأ الأول هو تقديم وسائل متعددة من التمثيل: ماذا سوف تتعلم الطالبة؟ والمبدأ الثاني هو توفير وسائل متعددة للعمل والتعبير: كيف سوف تتعلم الطالبة؟ المبدأ الثالث هو إعطاء وسائل متعددة من المشاركة: لماذا سوف تتعلم الطالبة؟ بالإضافة إلى ذلك، تقترح هذه القائمة للتأكد من أن المعلمة سوف تطبق مبادئ UDL بشكل صحيح. وسيتم شرح مبادئ UDL بالتفصيل للمعلمات في ورشة العمل، التي ستعقد قبل تطبيق الدراسة التجريبية.

تعليمات الاستخدام:

أولا، يجب على الملاحظ ملئ المعلومات العامة حول الفصول الدراسية وموضوع الدرس. الجدول أو التخطيط، يتمثل الخط الأفقي عدد الجلسات أو عدد الأيام لتطبيق الدروس. وفي المقابل، يتمثل الخط العامودي في خطوات تطبيق UDL. لقياس مدى تطبيق مبادئ UDL ، يجب على الملاحظ وضع علامة الاختيار (✓) أمام كل العناصر التي تم تحقيقها في كل دورة أو درس. إذا لم يتحقق هذا البند، يجب على الملاحظ وضع 'X' وهذه القائمة تساعد على تعديل أخطاء المعلم عند تطبيق مبادئ UDL .

اسم الفصل: **اسم المعلم:**

موضوع الدرس: **اسم الطالب:**

ضع علامة (✓) إذا حققت الهدف في الدرس، ووضع علامة خطأ (X) إذا لم يتحقق هذا الهدف.

مبادئ التصميم الشامل الثلاثة	الدرس							
	8	7	6	5	4	3	2	1
التقديم والعرض								
أقدم المعلومات لطلاب من خلال مجموعة متنوعة من الطرق(اللفظية والبصرية والسمعية واللمسية)								
أحدد بوضوح المفاهيم الأساسية بطرائق متعددة لتساعد الطلاب على فهم الموضوع								
أقدم المعلومات لطلاب في أشكال مختلفة كارسوم البانية والصور التوضيحية أو الخرائط المفاهيمية البصرية								
أقوم بتزويد الطلاب بملخص لكل درس								
تحتوى المواد المرئية التي أقدمها على عبارات مكتوبة								
استخدم الكتب الرقمية والالكترونية في التدريس								
أقوم بتوفير مصادر تعليمية مختلفة لطلاب لدعم التعلم								
أشجع الطلاب على استخدام مصادر من الانترنت بما يدعم تعليمهم								
أقوم بتزويد الطلاب ببرامج وتطبيقات يمكن استخدامها في تعليمهم								
المشاركة والتفاعل								
استخدم التلقين المباشر كطريقة أساسية في التدريس								

أشجع الطلاب على العمل في مجموعات صغيرة خلال الدرس								
أزود الطلاب بواجبات عن طريق الانترنت								
اسمح لطلاب باختيار الأنشطة التي تناسب اهتمامهم داخل الفصل								
أشجع الطلاب على التواصل عبر الانترنت أو وجها لوجه لمناقشة المواد الدراسية								
أحاول أن أصمم النشاطات الصفية التي تتطابق مع اهتمامات الطلاب								
أشجع الطلاب على الدراسة أو المذاكرة في مجموعات خارج الفصل								
أقوم بتقديم خيارات متنوعة لإنجاز الأنشطة داخل الفصل								
أقوم بتوفير فرص للطلاب لتنمية المراقبة الذاتية لديهم								
الفهم والتعبير								
أقوم بتزويد الطلاب بأنواع مختلفة من الواجبات التي تتضمن الوسائل التعليمية الحديثة كالعروض التقديمية ومقاطع الفيديو								
أشجع الطلاب على المراقبة الذاتية لسلوكياتهم أو تصرفاتهم داخل قاعة الدرس								
أشجع الطلاب على استخدام التقنية الحديثة(على سبيل المثال اللاب توب، والايباد) داخل الفصل لغرض التعلم.								
أقوم بتزويد الطلاب بأنواع مختلفة من الأنشطة لإظهار معرفتهم من خلال طرائق متعددة(مثل: الكتابة العرض، والتقديم، الرسم ..الخ)								
أقوم بتزويد الطلاب بإجراءات ارشادية لإكمال الواجبات المنزلية								
أقوم بتزويد الطلاب بنماذج أو أمثلة للمشاريع الصفية والواجبات								

								اسمح للطلاب لاختيار طريقتهم المناسبة المفضلة في إكمال الواجبات
								أقوم بتزويد الطلاب بتوجيهات واضحة لكيفية إكمال جميع المهام المعطاة لهم بنجاح
								احدد بوضوح نظام الدرجات لجميع المهام والواجبات قبل إعطائها لطلاب

References:

- Alsalem, M. (2015). Considering and Supporting the Implementation of UDL Among Teachers of Students Who Are Deaf and Hard of Hearing in Saudi Arabia.
- CAST (2011). Universal Design for Learning Guidelines version 2.0. Wakefield, MA: Author.

Appendix 21: Application of observation for objective in English

Guide to Using the Collection Instrument

The individual application of observation aims to measure the progress of each student during all sessions. This application consists of a horizontal column which includes some sessions or the number of days of lessons. In contrast, the vertical column contains the sub-goals for the lesson. The application also consists of three grades to assess the student's skill: they have mastered the skill, they have not mastered the skill, or they have somewhat mastered the skill.

Instructions for use:

In each session, the observer must accurately record the degree to which the student has mastered the skill by putting a mark in front of the appropriate level of mastery for each goal during all the sessions. The goal is to follow the student’s progress during the sessions. This list will be applied to both the control group and the experimental group. The development of students in the two groups will be compared with regard to the degree of thoroughness, the speed of mastery, and the number of sessions needed to achieve the goal.

Individual Application of Observation.

The Class room: Teachers' name:

The title of lesson: Student's name:

Select the degree of workmanship per to each lesson goal by putting a mark (✓) in front of the level perfection, offset by the number of lessons which the student has mastered the goal.

Lesson objectives	Lessons							
	1	2	3	4	5	6	7	8
To define the meaning of photography.								
The skill is mastered								
Somewhat is mastered								
Skill not mastered								
To distinguish between types of photography.								
The skill is mastered								
Somewhat is mastered								
Skill not mastered								
That lists the camera parts.								
The skill is mastered								
Somewhat is mastered								
Skill not mastered								
To distinguish between kinds of good cameras.								
The skill is mastered								
Somewhat is mastered								
Skill not mastered								

To list the good imaging standard (A4).								
The skill is mastered								
Somewhat is mastered								
Skill not mastered								
To create the environment for the filming.								
The skill is mastered								
Somewhat is mastered								
Skill not mastered								
To take a good picture of the standards using the camera.								
The skill is mastered								
Somewhat is mastered								
Skill not mastered								

Notes:……
……
…….

Appendix 22: Application of observation for objective in Arabic

دليل لاستخدام أداة جمع:

تهدف استمارة الملاحظة الفردية لكل طالبة لقياس التقدم في أداء كل طالبة على حدة خلال جميع الجلسات. يتكون هذا التطبيق من عمود الأفقي الذي يشمل بعض الجلسات أو عدد الأيام من الدروس. في المقابل، فإن العامود الرأسي يتضمن الأهداف الفرعية للدرس. التطبيق يتكون أيضا من ثلاث درجات لتقييم مهارة الطالبة: أن تتقن المهارة، لم تتقن هذه المهارة، وتتقن بعض الشيء من المهارة.

تعليمات الاستخدام:

في كل درس، يجب على الملاحظ تسجيل بدقة درجة أتقان الطالبة للمهارة عن طريق وضع علامة أمام المستوى المناسب من الإتقان لكل هدف خلال جميع الجلسات. والهدف من ذلك هو متابعة تقدم الطالبة أثناء الحصص أو الدروس. سيتم تطبيق هذه الاستمارة مع كلتا المجموعتين الضابطة والمجموعة التجريبية. تتم مقارنة تطور الطالبات في المجموعتين فيما يتعلق بدرجة الدقة، وسرعة الإتقان، وعدد الجلسات اللازمة لتحقيق هذا الهدف.

استمارة الملاحظة الفردية

الفصل: اسم المعلمة:

عنوان الدرس: اسم الطالبة:

حدد درجة الاتقان لكل هدف من أهداف الدرس عن طريق وضع علامة (✓) أمام مستوى درجة الاتقان المناسبة.

أهداف الدروس	الدروس							
١. تحديد معنى التصوير الفوتوغرافي	١	٢	٣	٤	٥	٦	٧	٨
يتقن المهارة								
نوعا ما اتقن المهارة								
لم يتقن المهارة								
٢.التمييز بين أنواع الصور								
يتقن المهارة								
نوعا ما اتقن المهارة								
لم يتقن المهارة								
٣. تعداد أجزاء الكاميرا								
يتقن المهارة								
نوعا ما اتقن المهارة								
لم يتقن المهارة								
٤.التمييز بين أنواع الكاميرات								
يتقن المهارة								
نوعا ما اتقن المهارة								
لم يتقن المهارة								

٥. تعداد معايير التصوير الجيد ل(A)								
يتقن المهارة								
نوعا ما اتقن المهارة								
لم يتقن المهارة								
٦. إنشاء بيئة للتصوير مناسبة.								
يتقن المهارة								
نوعا ما اتقن المهارة								
لم يتقن المهارة								
٧. لالتقاط صورة جيدة عن معايير استخدام الكاميرا .								
يتقن المهارة								
نوعا ما اتقن المهارة								
لم يتقن المهارة								

ملاحظات:

.....

.....

.....

Appendix 23: Application of Observation in Each Session in English

Guide to Using the Collection Instrument:

The collection instrument is designed to grasp the lesson planning steps for each session. Teaching methods, educational approaches, technologies used and assessment methods will all be included. This collection instrument will be administered for both the control and experimental groups.

Observation procedure:

The observer must attend from the beginning to the end of the lesson, for each session, to record what he or she saw during the explanation of the lesson. The goal is to compare teaching methods in the experimental group using the UDL approach to a control group using alternative methods of teaching.

Application of Observation in Each Session.

Group name: ……..... The subject of lessens ……..

Session Number: ……..

The teaks	The notes
Teaching aids used	1. …… 2. …….. 3. …… 4. …… 5. ……
Methods View of Lesson	1. …… 2. …….. 3. …… 4. …… 5. ……
Assessment methods	1. …… 2. …….. 3. …… 4. …… 5. ……

Appendix 24: Application of Observation in Each Session in Arabic

دليل لاستخدام نموذج جمع المعلومات عن خطوات الدرس:

تم تصميم أداة جمع لفهم خطوات التخطيط للدرس لكل درس. وسوف تتضمن هذه المعلومات جميع وسائل التدريس والمناهج التعليمية، والتقنيات المستخدمة وأساليب التقييم. سوف يستخدم هذا النموذج لجمع المعلومات لكلا المجموعتين الضابطة والتجريبية.

إجراء الملاحظة:

الملاحظ يجب أن يحضر من البداية وحتى نهاية الدرس في كل مرة، وذلك لتسجيل ما سوف يشاهد أثناء شرح الدرس. والهدف هو للمقارنة بين أساليب التدريس في المجموعة التجريبية باستخدام نهج UDL والاساليب المستخدمة في المجموعة الضابطة.

استماره ملاحظة في كل درس

اسم المجموعة: ..... موضوع الدرس :.....

رقم الدرس: .....

المهام	الملاحظات
وسائل التدريس المستخدمة	. ...
طرق عرض الدرس	. ...
أساليب التقييم	. ...

Appendix 25: Pre - test and post - test in English

Pre Test / Post Test

Student's name: Level:

The group:

Place a checkmark (✓) if the student answered the questions correctly, according to mastering the skill.

Standards and Tasks	The level of workmanship			Notes
	Passed	Somewhat	not passed	
General Questions:				
What are the parts of the camera?				
What types of cameras?				
What kinds of photographs?				
What are the steps to take a picture of the passport?				
The practical application based on the criteria				
Can the student open the camera correctly?				
Dose the student put the camera on the stand?				
Does the student put a white background before taking a picture?				
Does the student put the camera in the proper place of lighting?				
Does the student make sure of the client's commitment to the terms of taking a picture of a passport? Such as, do not wear glasses or put on makeup.				
Is the student able to take a picture well and according to the standards?				
Is the student able to print the image in the final form?				
Total skills				

*Shawacademy (2016). Your Diploma in Photography course.http://www.shawacademy.com.

Appendix 26: **Pre - test and post - test in Arabic**

الاختبار القبلي والبعدي

اسم الطالبة: المستوى الدراسي:

المجموعة:

من فضلك ضعي علامة (✓) على حسب مستوى اتقان الطالبة لكل هدف

المعايير والمهام	مستوى الاتقان			ملاحظات
	انجز	نوعا ما	لم ينجز	
أسئلة عامة:				
ماهي أجزاء الكاميرا؟				
ماهي أنواع الكاميرات؟				
ماهي أنواع الصور الفوتوغرافية؟				
ماهي خطوات أخذ صوره لجواز السفر والهوية؟				
ماهي المعايير لتصوير صورة لجواز السفر أو الهوية؟				
التطبيق العملي على أساس المعايير:				
هل تستطيع الطالبة فتح الكاميرا بطريقة صحيحة؟				
هل تستطيع الطالبة وضع الكاميرا على الحامل الخاص بالكاميرا؟				
هل وضعت الطالبة الخلفية البيضاء قبل البدء بالتصوير؟				
هل الطالبة تضع الكاميرا في المكان المناسب من الإضاءة؟				
هل الطالبة تتأكد من التزام العميل لشروط التقاط صورة لجواز السفر؟ مثل، لا يرتدون النظارات ووضع الماكياج.				
هل الطالبة تلتقط الصورة وفقا للمعايير؟				
هل يستطيع الطالبة طباعة الصورة في شكلها النهائي؟				
مجموع المهارات				

Appendix 27 : General Information for Students in English

Model of general information for students:

The student data collected will contribute to the understanding of the needs of both cognitively disabled students and average students. The analysis of this data should reveal which approaches the students prefer from among the teaching methods and aids, reinforcement techniques and assessment methods under study. The aim of this collection activity is to determine for each lesson whether a UDL approach is in line with the wishes and the abilities of students. The UDL approach will be used with the experimental group, while alternative approaches will be used with the control group.

General Information for Students

		The name of students			
		Student 1	Student 2	Student 3	Student 4
Teaching methods	The student prefers learning by visual means: pictures, video, computer and iPad.				
	The student prefers learning by means of the Audio recorder, an audio clip and songs.				
	The student prefers learning by practical means: holographic and touch real materials.				
	The student prefers learning by writing means.				
The method of reinforcement	The student prefers the physical reinforcement, such as games, pens ... etc.				
	The student prefers the symbolic reinforcement, such as stickers.				
	The student prefers the moral reinforcement, such as praising them.				

	The student prefers the social reinforcement, such as the trips and the playing with friends.				
Assessment methods	The student prefers using the technology in the writing of homework, such as the utilization of the Internet and e-mail.				
	The student prefers to answer lesson activities and face-to-face.				
	The student avoids giving the answer in front of others students.				
	The student prefers the participation in collective actions.				

Appendix 28: General Information for Students in Arabic

نموذج المعلومات العامة للطالبات:

البيانات التي سوف يتم جمعها في هذا النموذج عن الطالبات سوف يسهم في فهم احتياجات كل الطالبات من ذوى الاعاقة الفكرية واقرانهم العاديين. كما أن تحليل هذه البيانات يجب أن تكشف عن رغبات الطالبات من ناحية: طرق التدريس المفضلة لهم والوسائل وتقنيات التعليم والتعزيز وأساليب التقييم في إطار الدراسة. والهدف من جمع هذه المعلومات أيضا هو لتحديد أذا كان النهج UDL يتماشى مع رغبات وميول وقدرات الطالبات جميعهم. سيتم استخدام نهج UDL مع المجموعة التجريبية، في حين سيتم استخدام أساليب بديلة مع المجموعة الضابطة.

معلومات عامة عن الطالبات

		أسماء الطالبات			
		الطالبة ١	الطالبة ٢	الطالبة ٣	الطالبة ٤
طرق التدريس	تفضل الطالبة التعلم عن طريق الوسائل البصرية: صور، فيديو، الكمبيوتر وتطلب الشركة				
	الطالبة تفضل التعلم من خلال مسجل الصوت، أو مقطع صوتي والاناشيد				
	الطالبة تفضل التعلم بالوسائل العملية: كالوسائل ثلاثية الأبعاد وتلمس المواد في الواقع				
	يفضل الطالبة التعلم عن طريق الوسائل الكتابة				
طرق التعزيز	الطالبة تفضل التعزيز المادي، مثل الألعاب، والأقلام ... إلخ				
	الطالب تفضل التعزيز الرمزي، مثل الملصقات				
	الطالب تفضل التعزيز المعنوي، مثل الثناء عليه				
	الطالبة تفضل التعزيز الاجتماعي، مثل الرحلات واللعب مع الأصدقاء				
طرق التقييم	الطالب يفضل استخدام التكنولوجيا في كتابة الأعمال المنزلية، مثل استخدام الإنترنت والبريد الإلكتروني				
	تفضل الطالبة للإجابة على أنشطة الدروس وجها لوجه				
	الطالبة تتجنب الإجابة أمام الطالبات الأخريات				
	الطالب يفضل المشاركة في الأعمال الجماعية				

Appendix 29: The results of teachers in both groups.

Shows the number of methods used with the experimental group.

Means used	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	The average
A UDL-designed program	*	*	*	*	*	
Realistic means: camera, camera holder, printer	*	*	*	*	*	
Visual means, such as the use of iPads and smart devices	*	*	*	*	*	
Multimedia software		*	*	*	*	
Video clips	*	*	*	*	*	
PowerPoint presentations			*	*	*	
Cards and photos	*	*	*	*	*	
Magazines and brochures			*	*	*	
Computers	*	*	*	*	*	
Total number of instruments used per lesson	6	7	9	9	9	٨

Shows the number of methods of teaching or presentation used with the experimental group.

Means used	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	The average
Self-education in UDL-designed program	*	*	*	*	*	
Use modeling and simulation	*	*	*	*	*	
Use realistic learning, such as photography	*	*	*	*	*	
Use story mode			*	*	*	
Use the method of representation and exchange of roles			*	*	*	
Use group teaching methods	*		*	*	*	
PowerPoint presentations			*	*	*	
Magazines, photos, cards and brochures	*	*	*	*	*	
Use peer learning methods	*	*	*	*	*	
Use discussion and dialogue	*	*	*	*	*	
Use computers	*	*	*	*	*	
Total number of methods used per lesson	8	7	11	11	11	9

Shows the number of methods of evaluation used with the experimental group.

Means used	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	The average
Evaluation by the UDL-designed program	*	*	*	*	*	
Evaluation by realistic means: camera, camera holder, printer	*	*	*	*	*	
Evaluation by paper	*	*	*	*	*	
Evaluation by oral questions	*	*	*	*	*	
Evaluation using representation and role exchange	*	*	*	*	*	
The students send assignments by email to the teacher			*	*	*	
Using social media to express students' opinions, such as Twitter and Instagram.			*	*	*	
Evaluation using computers			*	*	*	
Search for information on the Internet			*	*	*	
Total number of evaluation methods used per lesson	5	5	9	9	9	7

Shows the number of methods used with the control group.

Means used	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	The average
Realistic means: camera, camera holder, printer	*	*			*	
Visual means such as: the use of iPads and smart devices						
Multimedia software						
Video clips						
PowerPoint presentations	*	*	*	*	*	
Cards and photos				*		
Magazines and brochures						
Computers						
Total number of instruments used per lesson	٢	٢	١	٢	٢	2

Shows the number of methods of teaching or presentation used with the control group.

Means used	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	The average
Use of modelling and simulation methods						
Use of realistic learning, such as photography	*	*				
Use of story mode						
Use of methods of representation and exchange of roles						
Use of group teaching method			*	*		
PowerPoint presentations						
Magazines and ،photos ،Cards brochures						
Use of peer learning methods					*	
Use of discussion and dialogue methods	*	*	*			
Use of computers and multimedia						
Total number of methods used per lesson	٢	٢	٢	١	١	2

Shows the number of methods of teaching or presentation used with the control group.

Means used	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	The average
Evaluation through realistic means, such as: cameras, camera holders, printers						
Evaluation using papers	*	*	*	*	*	
Evaluation using oral questions				*		
Evaluation using representation and the exchange of roles						
The students send assignments by email to the teacher						
Using social media to express student opinions, such as Twitter, Instagram.						
Evaluation using computers						
Searching for information on the Internet						
Total number of evaluation methods used per lesson	١	١	١	٢	١	1

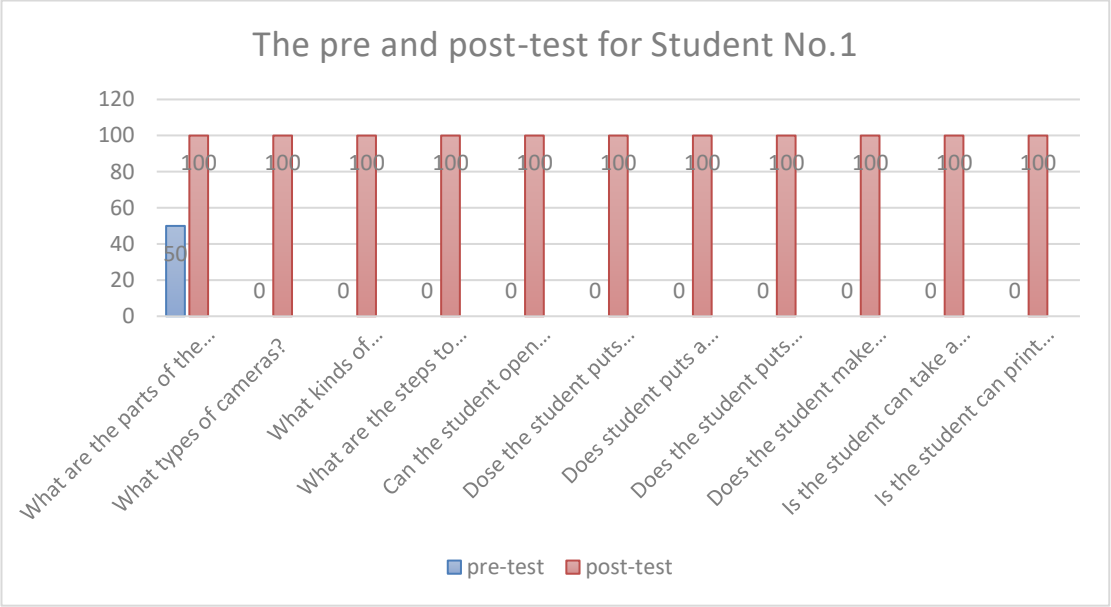
Appendix 30: The results of each students.

Results of students in both the experimental and control groups, with both SID and SNSEN:

- The results of the pre and post-tests for SID in the experimental group:

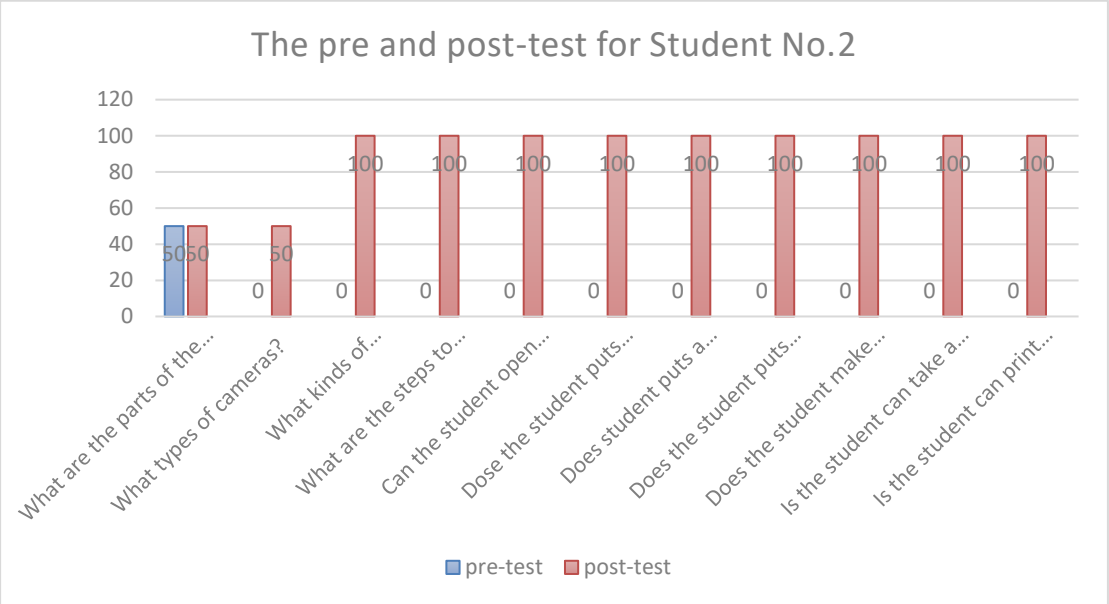
The performance of the students was measured by calculating the grades as follows: if the student received 100%, they are said to have passed. On the other hand, if a student scored 0%, they are said to have failed. If they scored 50%, they are said to be 'somewhat successful'.

The performance of the first student:



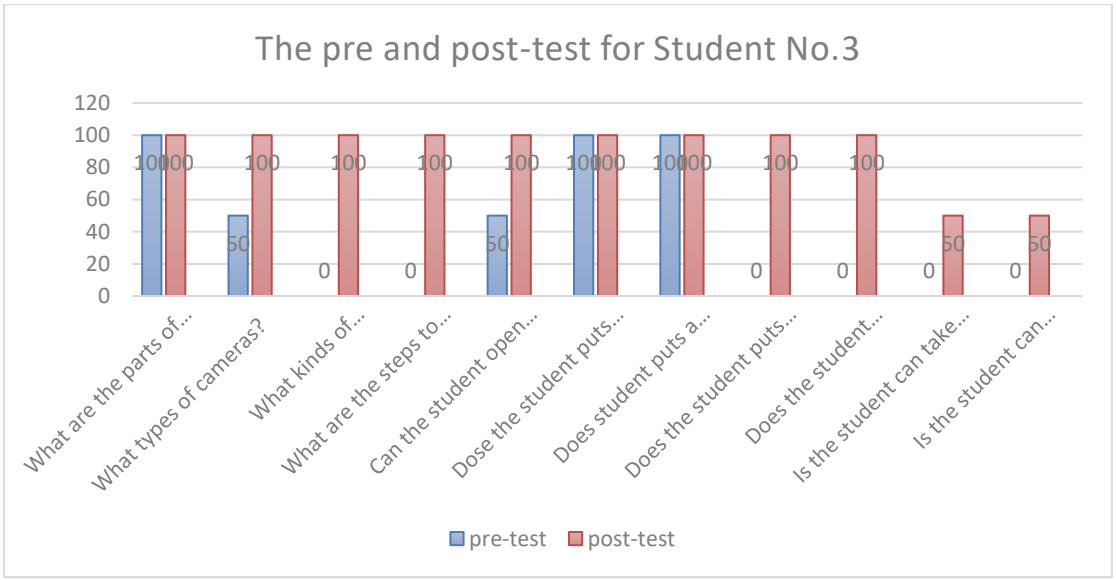
We can see from the chart the first student gained 100% in all photography skills in the post-test. Conversely, in the pre-test she scored 0 in most of the skills, except the first photography skill, where she scored 50.

The performance of the second student:



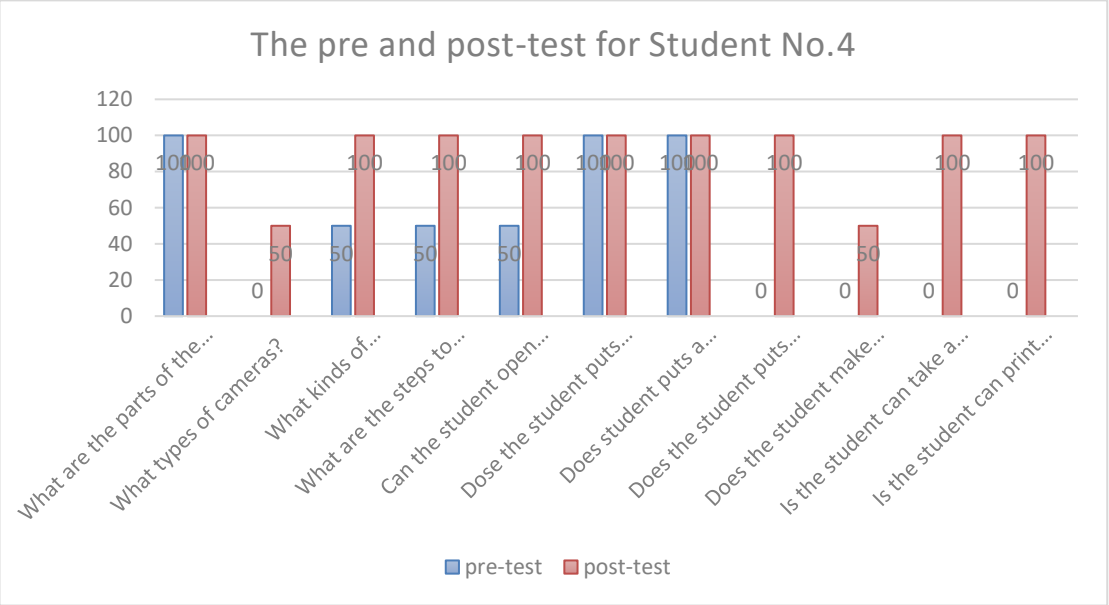
From the chart, we can see that in the post-test the student scored 100% in skills number 4-9, and 50% in the first and second skills. However, in the pre-test, she scored 50% in the first and second skills and 0% in most of the remaining skills.

The performance of the third student:



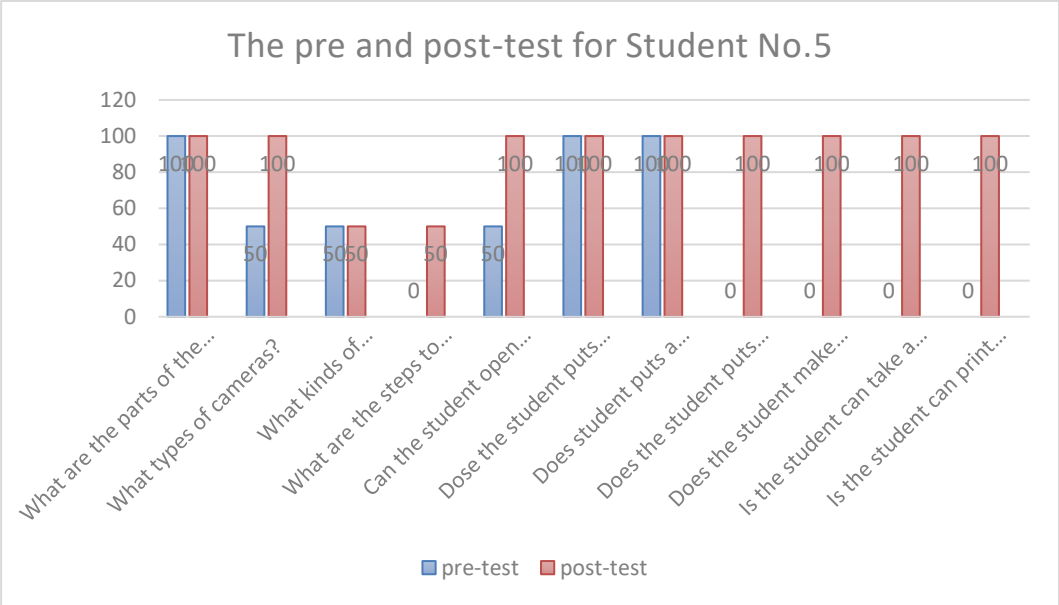
The results of the previous chart show improvement in the photography skills of the student. This improvement appeared in the 2nd, 3rd, 4th, 5th, 8th, 9th, 10th and 11th skills, where the percentages scored in the pre-test were either 0 or 50. These increased to either 50 or 100 in the post-test.

The performance of the fourth student:



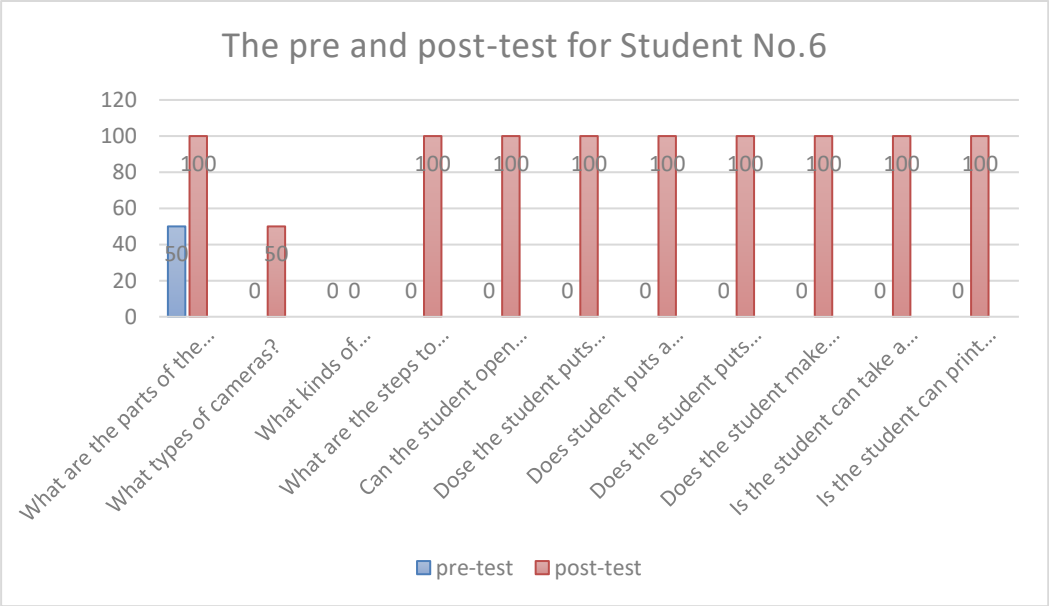
It is obvious from the previous chart that the student scored 100% in skills 1 and 6 in both the pre- and post-test. There was also an obvious improvement in the performance of the student in the post-test, given that her scored increased to either 50 or 100%.

The performance of the fifth student:



In the results from the post-test we can see that there was an increase in the performance in most of the skills, where she scored 100%, except in the 3rd and 4th skill, where she scored 50%. We can also see stability in the performance of the student between the pre- and post-test and that she scored 100% in the 1st, 6th and 7th skills and 50% in the 3rd skill.

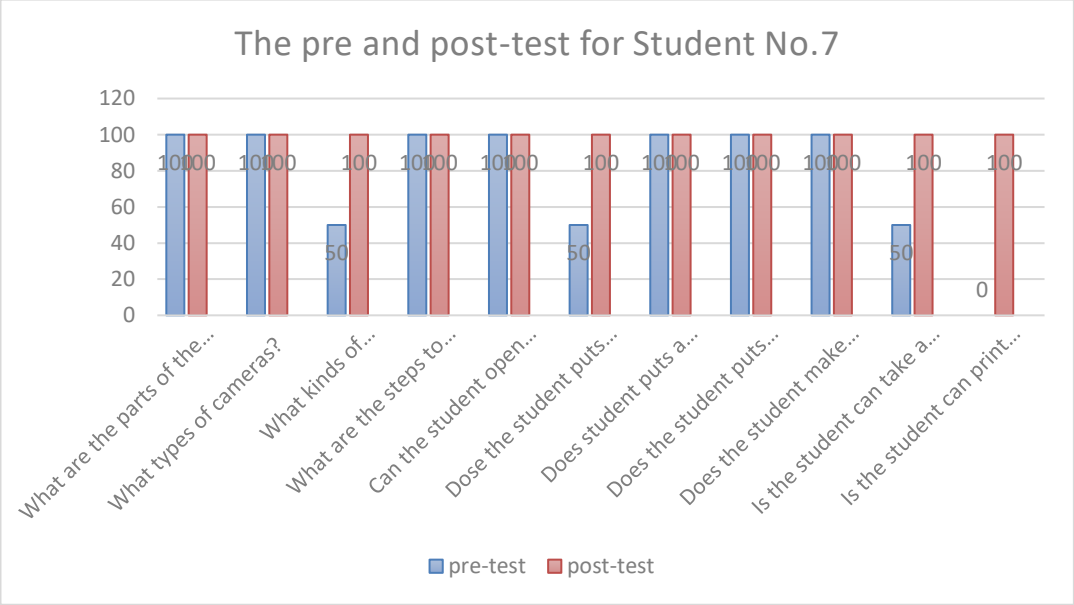
The performance of the sixth student:



From the previous chart we can see that the performance of the student improved between the pre- and post-tests in most of the skills. She scored 0% in pre-test for most of the skills, but scored 100% in the same skills during the post-test. She also scored 0% in the second skill in the pre-test but 50 in the post-test. In the 3rd skill, she scored 0% in the pre- and post-test as she was absent.

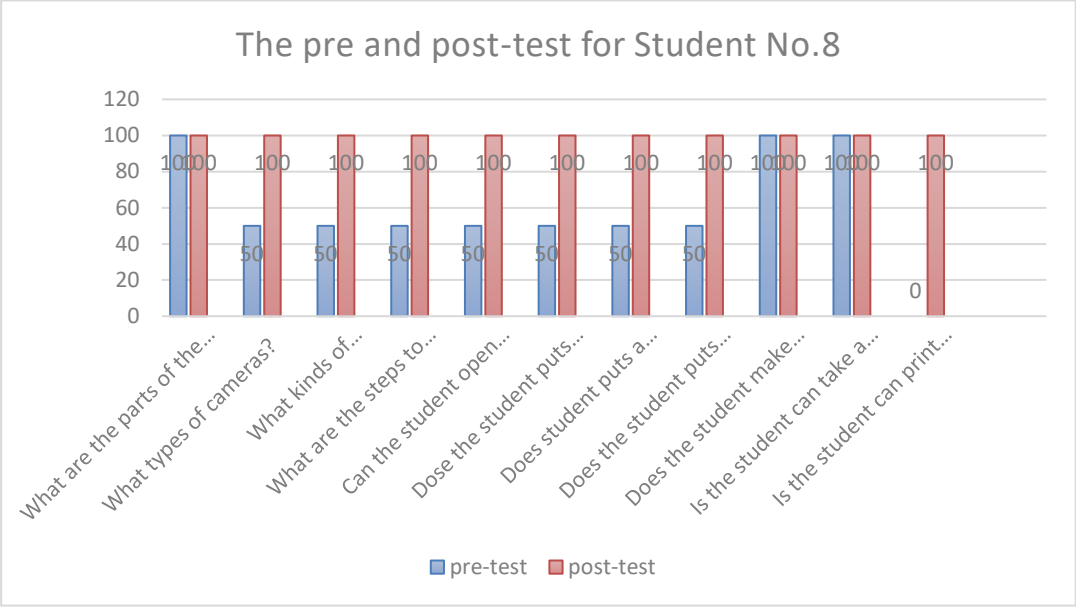
2. The results of the pre- and post-tests for SNSEN in the experimental group:

The performance of the seventh student:



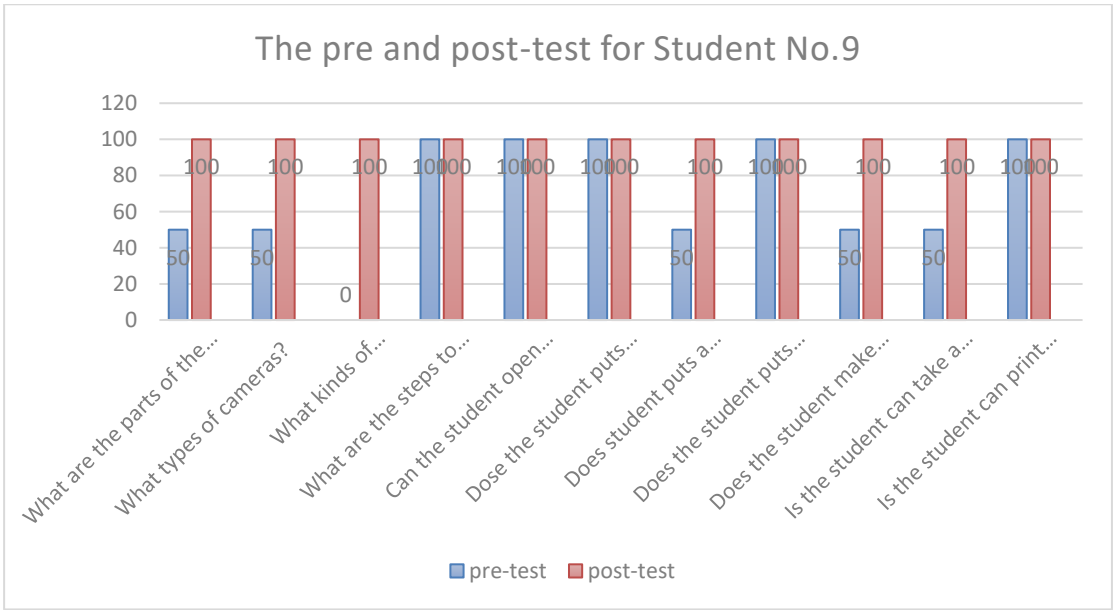
It is clear from the chart that the student obtained 100% in all photography skills. The performance of the student is consistent across both pre- and post-tests, as she scored 100% on both tests in seven skills. There was an obvious improvement in the 3rd, 6th and 10th skills.

The performance of the eighth student:



There is a marked improvement in the performance between the pre-test, where she increased from 0% to 100%, and the post-test, where she scored 100%.

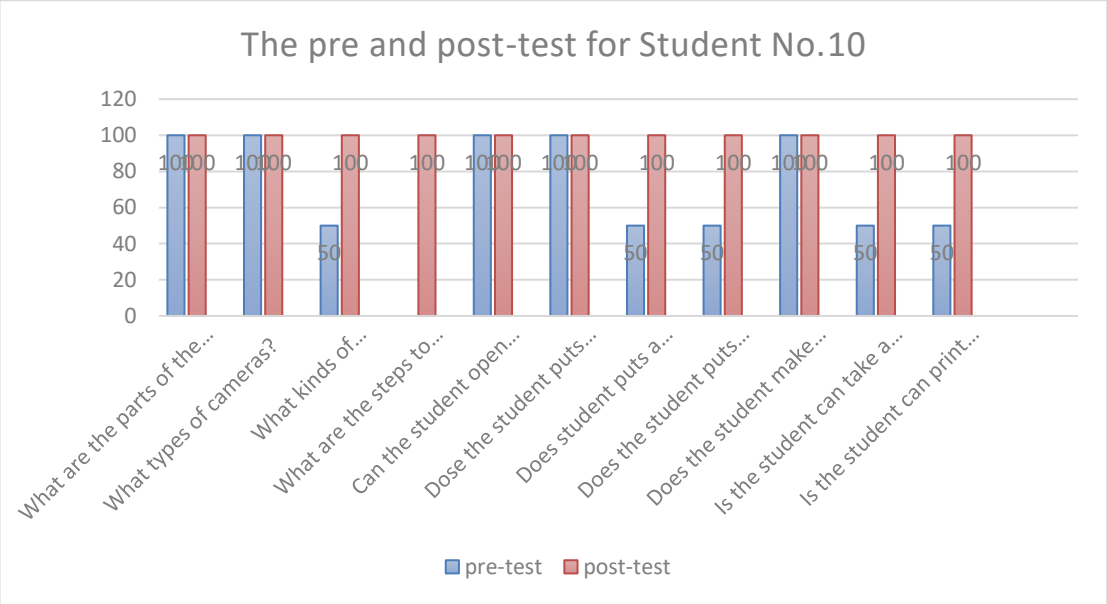
The performance of the ninth student:



From the chart, we can see that the student improved in all skill sets; she scored 100% in all of the post-test. We can also see that the performance was the same in both the pre- and

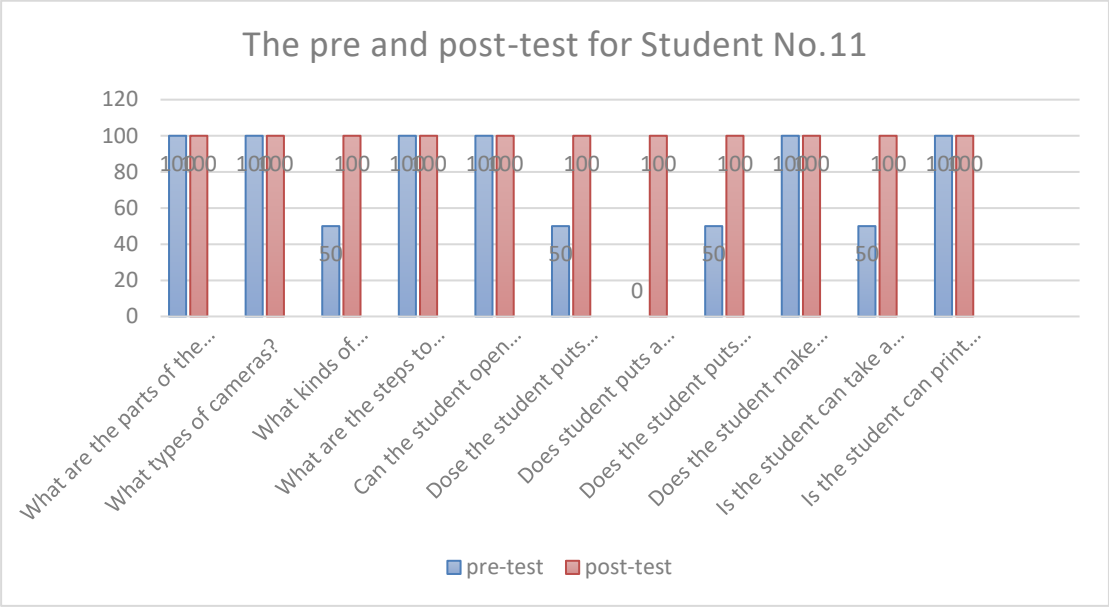
post-tests. She scored 100% in both tests in five skills and had a marked improvement in the 1st, 2nd, 3rd, 7th, 9th and 10th skills.

The performance of the tenth student:



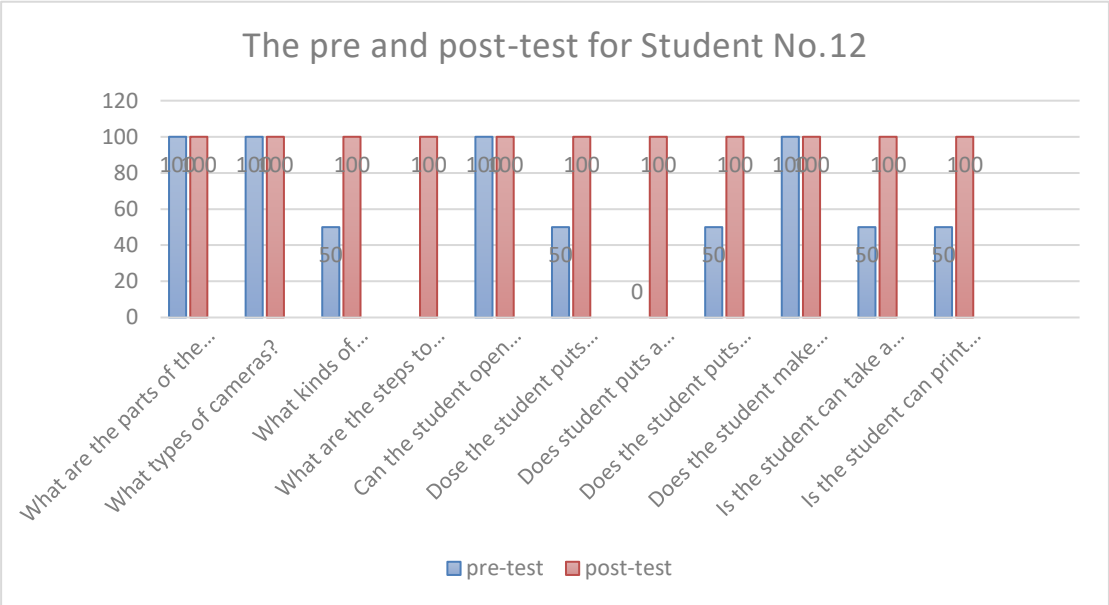
There was a marked improvement in this student's performance between the pre-test, where she improved from 0 to 100%, and the post-test, where she scored 100% in all skills.

The performance of the eleventh student:



From the chart, we can see an improvement from the student in all skills; we can see that she scored highly in all skill sets. We can also see that her performance was stable across both pre and post-tests, as she scored 100% in both tests across 6 skills. There was an obvious improvement in the 3rd, 6th, 7th, 8th and 10th skills.

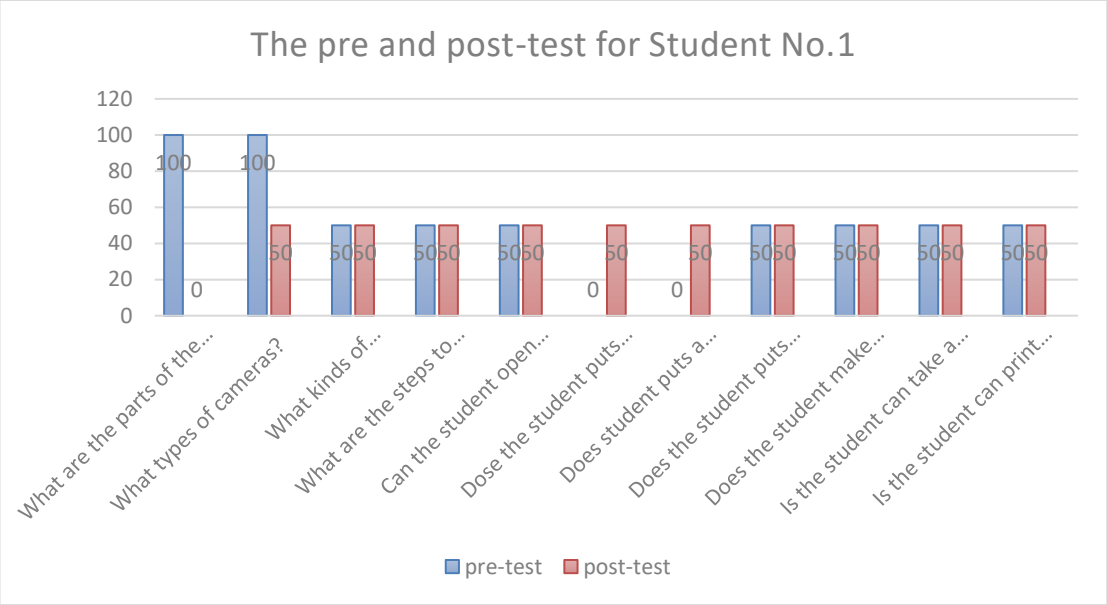
The performance of the twelfth student:



From the chart we can see an improvement in all skills and that the performance was the same in both the pre and post-test. She scored 100% in both tests in the 1st and 2nd skills, and there was an obvious improvement in the 3rd, 4th, 6th, 7th, 8th, 10th and 11th skills.

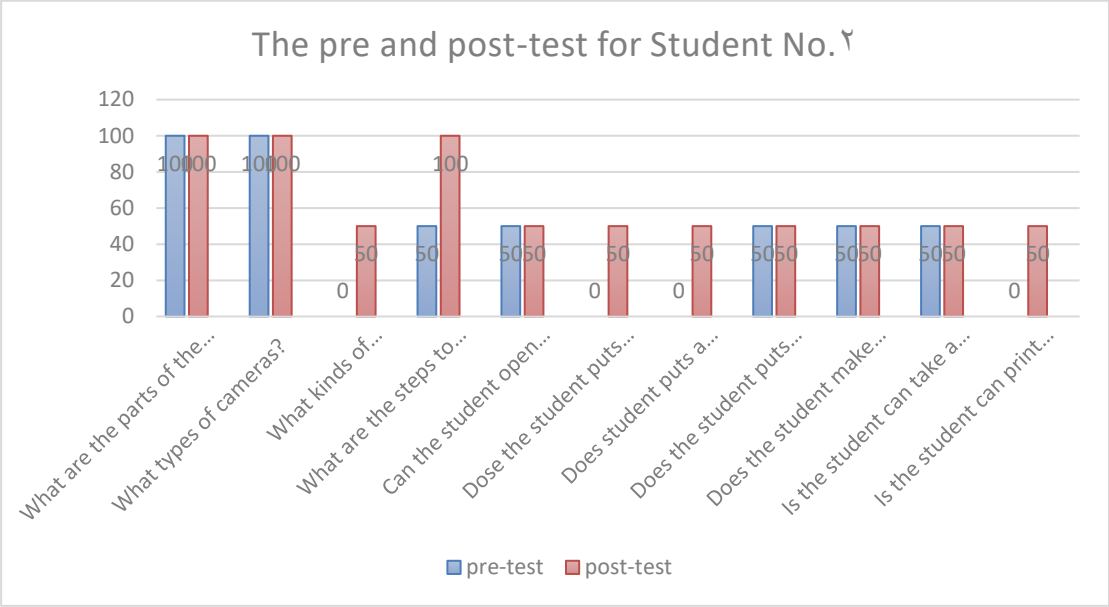
3. The results of the pre- and post-tests for SID in the control group:

The performance of the first student:



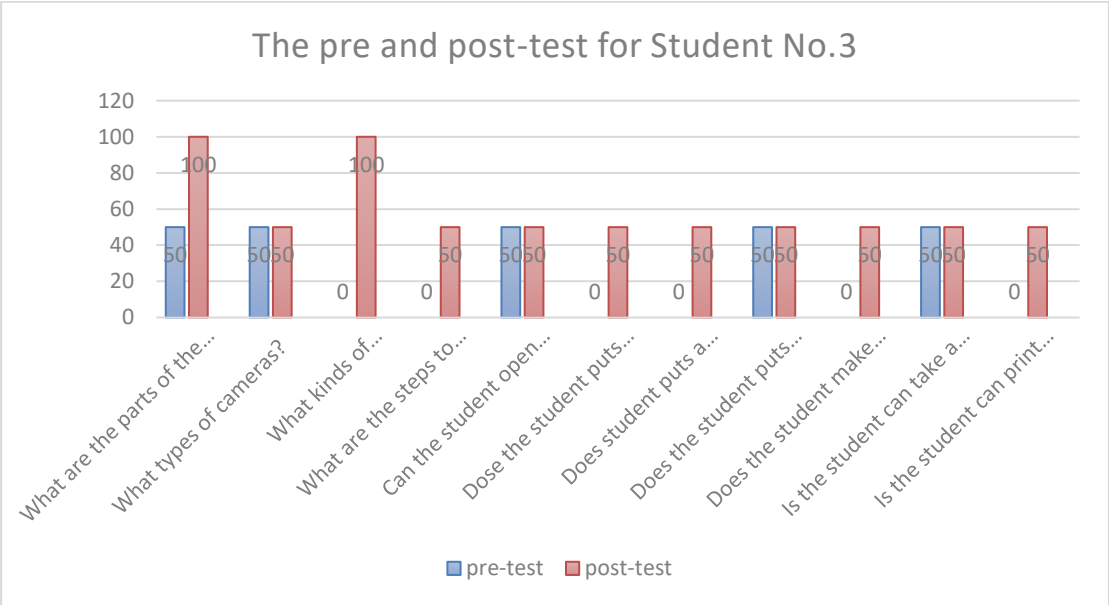
From the chart, we can see that the student scored 50 in most of the pre- and post-tests. Moreover, there was an improvement in the performance of the student in the 6th and 7th skills, from 0 to 100%. The performance of the student decreased in the 1st and 2nd skills. This is because they were absent and because of their intellectual disabilities.

The performance of the second student:



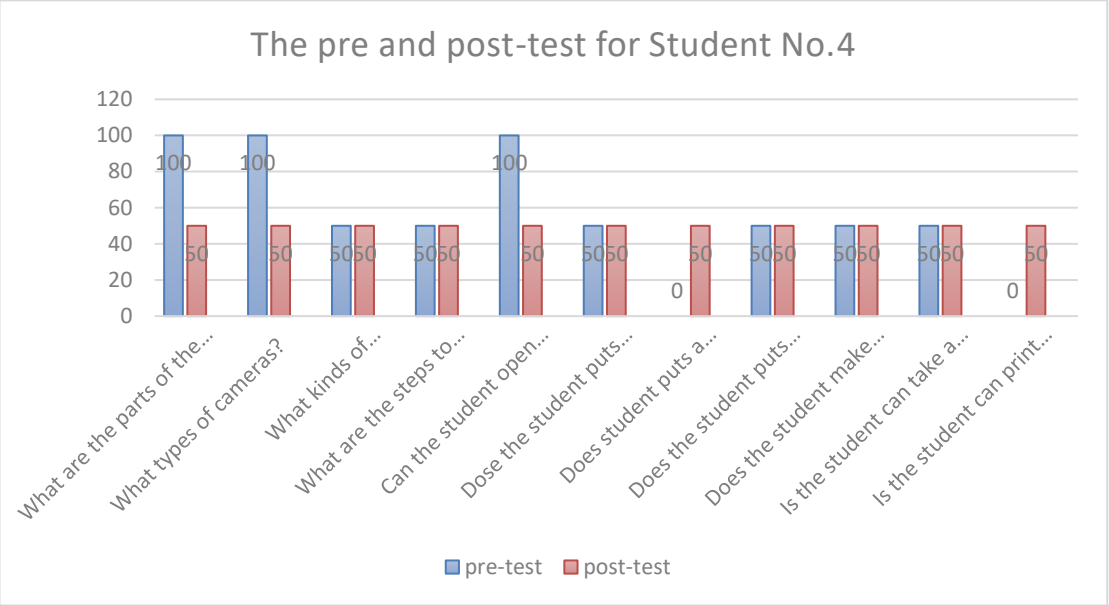
From the chart, we can see that this student scored between 50 and 100% in the pre- and post-tests for most of the skills. We can also see an improvement in the 6th and 7th skills, from 0 to 50%. This is due to the weak memory recall skills of the intellectually disabled student.

The performance of the third student:



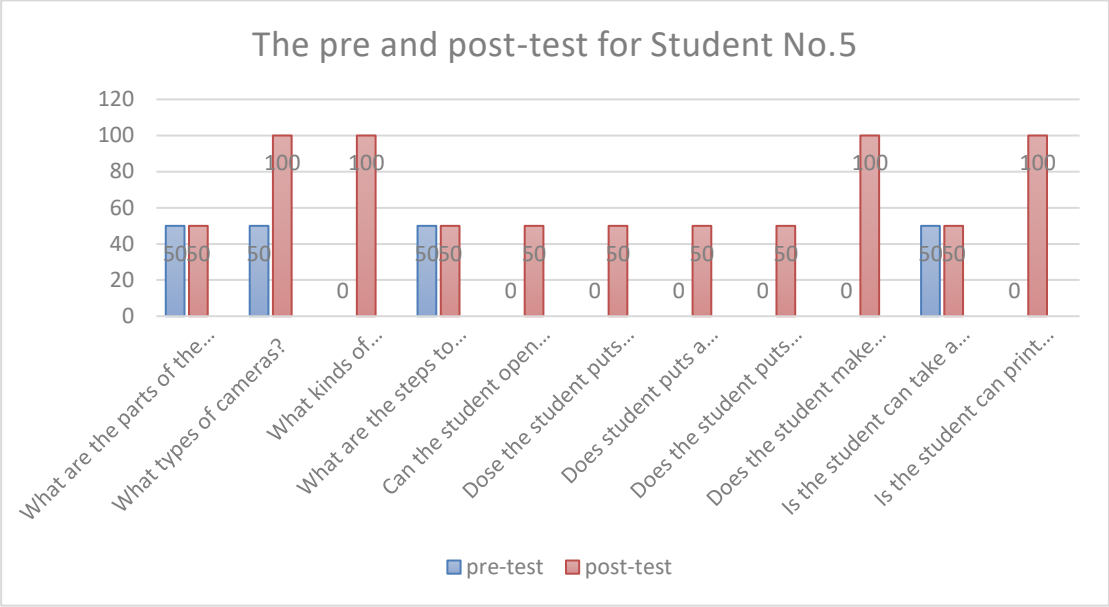
From the chart, we can see that the student's performance in the pre- and post-test in the 2nd, 5th, 8th and 10th skills was 50%. We can also see a marked improvement in her performance in the 1st and 3rd skills, from 0% to 50% and 0% to 100%, respectively.

The performance of the fourth student:



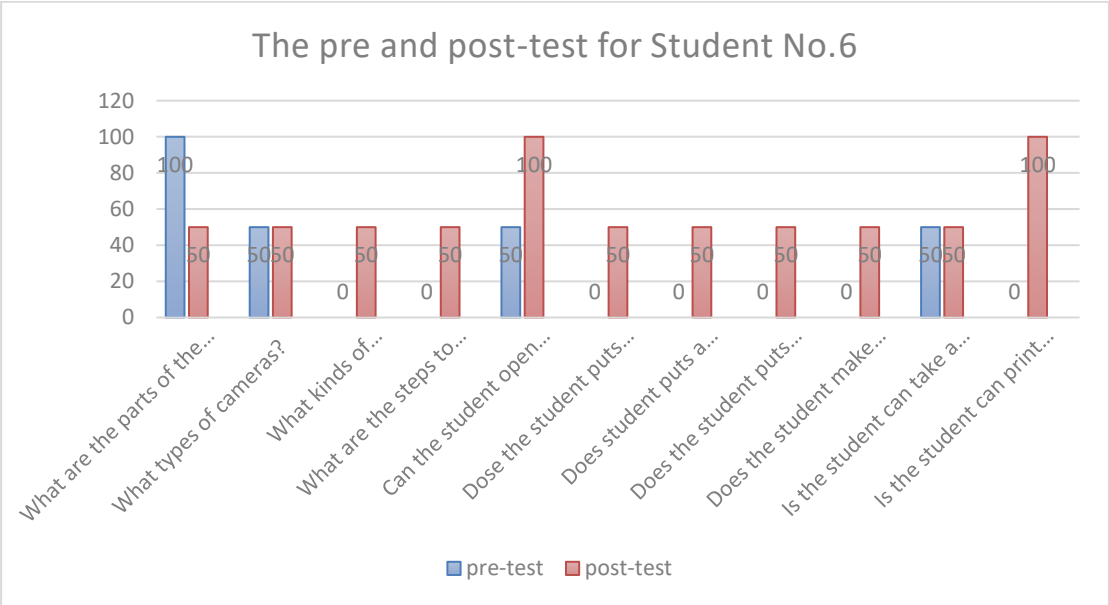
From the above chart we can see both stability and a decrease in the performance of the student between the pre- and post-tests in most of the skills, with scores of either 50% or 100%. We can also see an improvement in the performance of the student in the 7th and 11th skill, from 0% to 50%. The performance of the student decreased in the 1st, 2nd and 5th skills because of the weakness of SID.

The performance of the fifth student:



From the chart, we can see that the performance of the student in the pre-test is low, as she scored 0% or 50%. Her performance slightly improved in most of the skills.

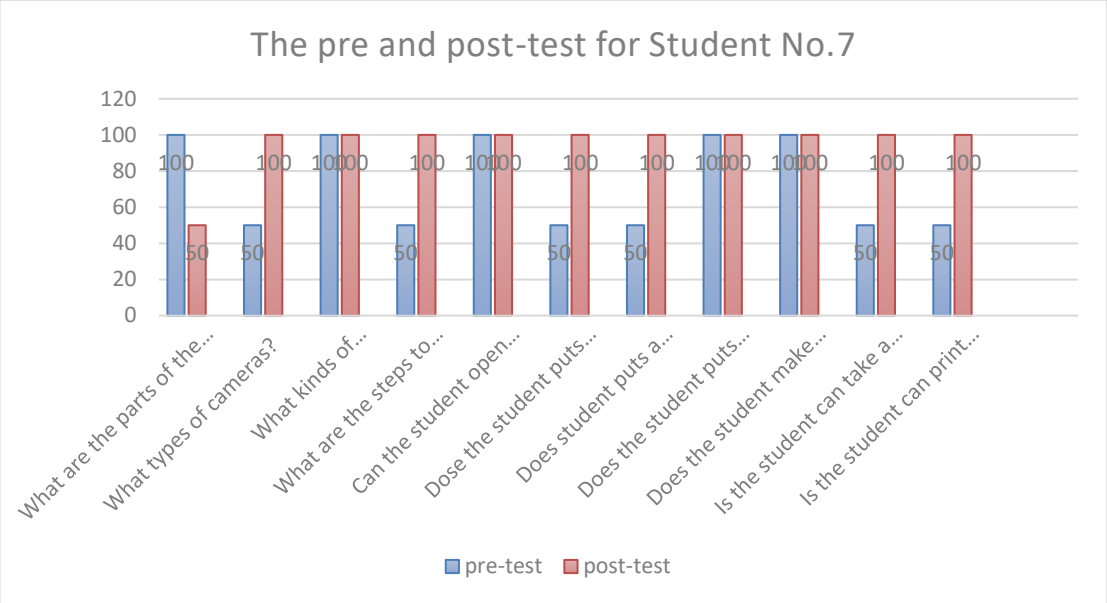
The performance of the sixth student:



From the chart, we can see that the performance of the student in the pre-test is low, with scores of either 0% or 50%. The performance improved slightly in most of the skills to 50%, and in the 5th and 11th skills, where it was 100%. There was a decrease in the 1st skill in the post-test, where she scored 50% instead of the previous 100%.

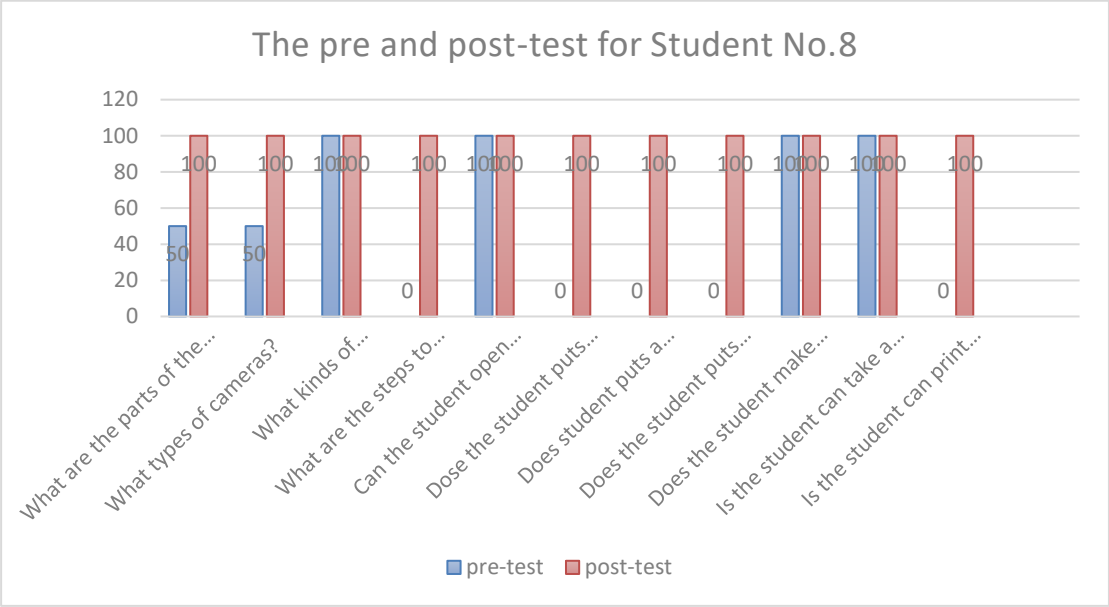
4. The results of the pre- and post-tests for SNSEN in the control group:

The performance of the seventh student:



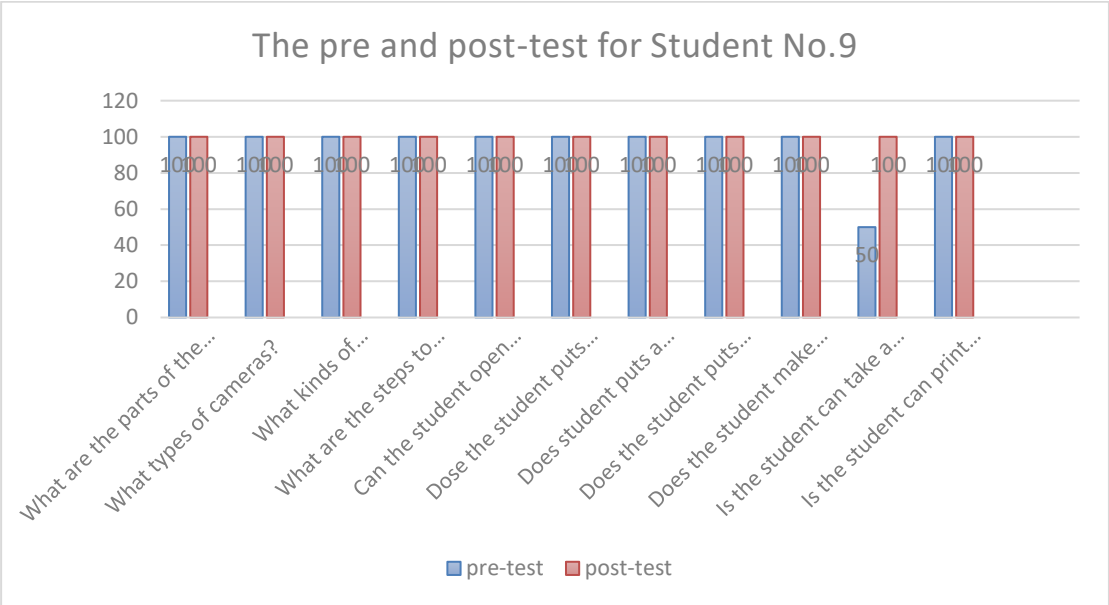
It is obvious from the chart that the student got high marks in nearly all the skills, scoring 100% in the post-test. However, she only scored 50% in the first skill. The performance of the student was fixed between the pre- and post-test, as she scored 100% in both tests for 4 skills. There was an obvious improvement in the 2nd, 4th, 5th, 10th and 11th skills.

The performance of the eighth student:



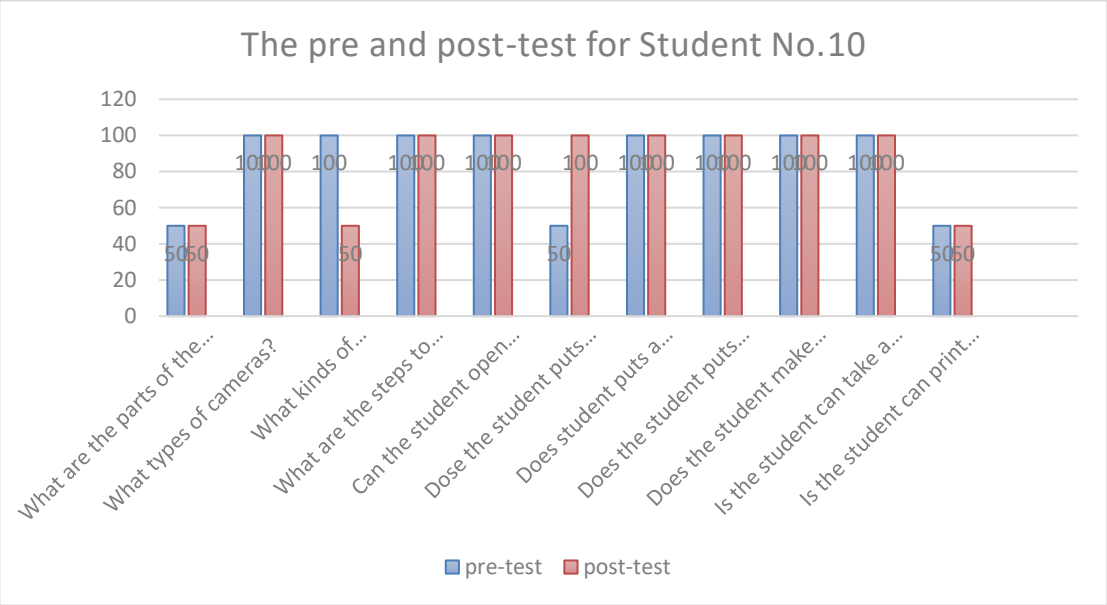
It is obvious from the chart that the student got high marks in all skills, scoring 100% in the post-test. The performance of the student was fixed between the pre- and post-test, as she scored 100% in both tests for 4 skills. There was an obvious improvement in the 1st, 2nd, 4th, 6th, 7th, 8th and 11th skills.

The performance of the ninth student:



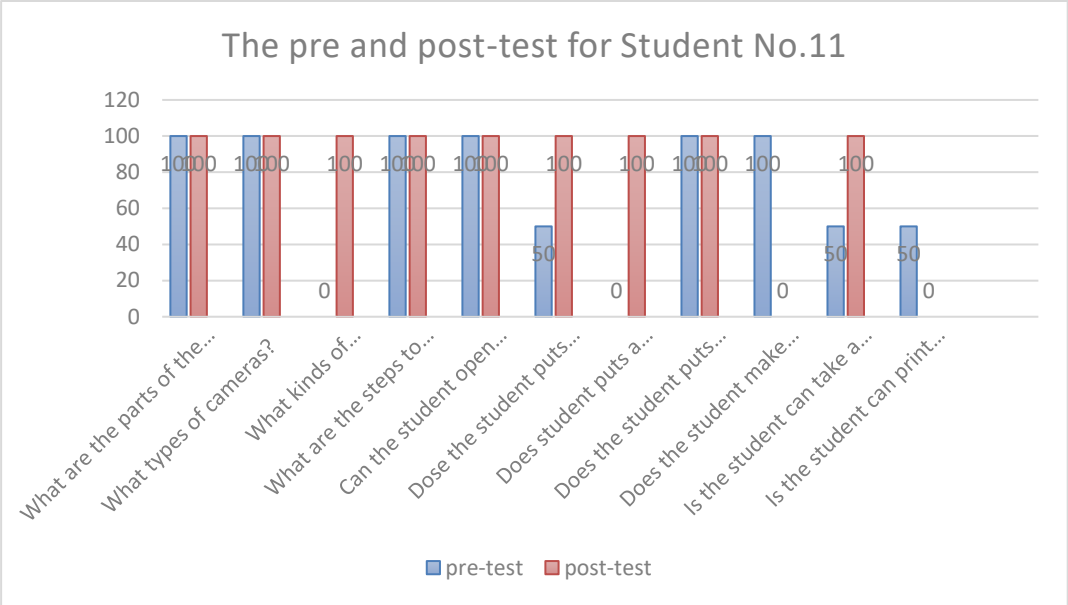
It is obvious from the chart that the student got high marks in all skills, scoring 100% in the post-test. There was an obvious improvement in the 10th skill.

The performance of the tenth student:



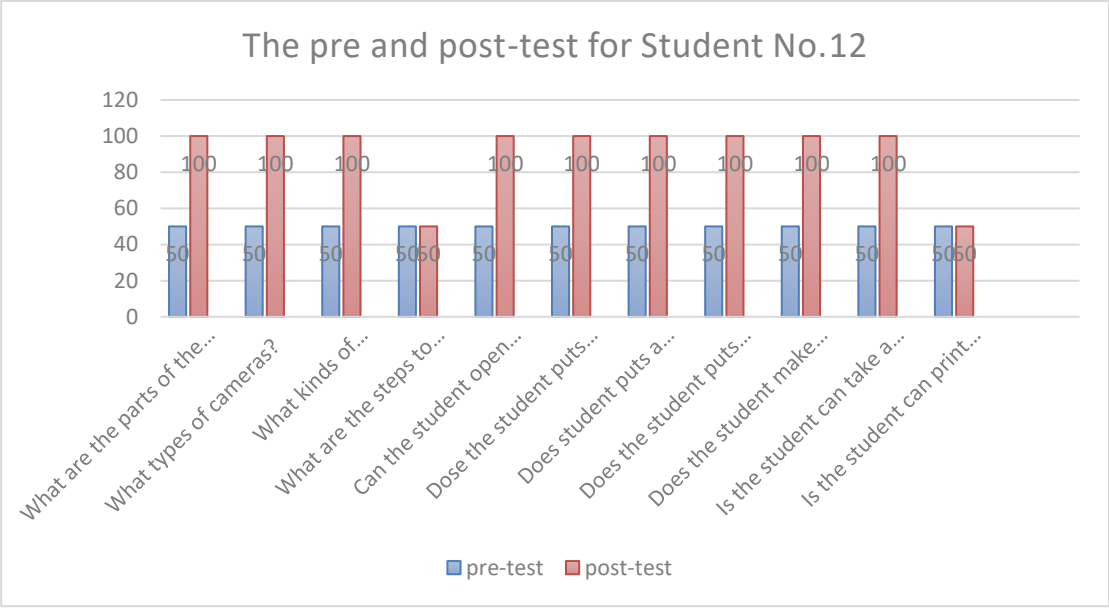
It is obvious from the chart that the student got high marks in all the skills, scoring 100% in the post-test. We can also see that there was an obvious performance increase in the 6th skill, but that the performance of the student was fixed between the pre- and post-test, as she scored 50% in the 1st and 11th skills. She dropped back in the 3rd skill in the post-test, scoring 50% instead of 100%.

The performance of the eleventh student:



It is obvious from the chart that the student got high marks in all the skills, scoring 100% in the post-tests. There was an obvious improvement in the 3rd, 6th and 8th skills. However, there was a reduction in performance in the post-test, as she scored 0% in the 9th and 11th skills.

The performance of the twelfth student:



It is obvious from the chart that the student's performance improved in the post-test, as the marks improved from 50% in the pre-test to 100% in the post-test. From the chart we also see that there is stability in the 4th and 11th skills, with a score of 50%.

Appendix 31: Names of arbitrators

Reem Saad Al Qahtani	Special education teacher
Amani Mohammed Al Shehri	Special education teacher
Hanan Ahmed Khayal	Special education teacher
Safa Ali Tarbzouni	Special education teacher

The teachers have changed the software in terms of colour, quality of sound and pronunciation of words. Also, the ease of questions in tests.

Appendix 32: Teacher reviewers the Pre and Post test

Before the teacher reviewers	After the teacher reviewers
General Questions:	General Questions:
What are the parts of the camera?	What are the parts of the camera?
What are the types of digital cameras?	What types of cameras?
What types of professional images?	What kinds of photographs?
What are the steps to take a picture of the passport?	What are the steps to take a picture of the passport?
The practical application based on the criteria	The practical application based on the criteria
Can the student press on button shutting and opening?	Can the student open the camera correctly?
Dose the student puts the camera on the stander?	Dose the student puts the camera on the stander?
Does student puts a white background before taking a picture?	Does student puts a white background before taking a picture?
Does the student select the place of the camera in the proper place of lighting?	Does the student puts the camera in the proper place of lighting?
Does the student make sure from the client's commitment to the terms of taking a picture of a passport? Such as, do not wear glasses and put makeup.	Does the student make sure from the client's commitment to the terms of taking a picture of a passport? Such as, do not wear glasses and put makeup.
Is the student can take a picture well and according to the standards?	Is the student can take a picture well and according to the standards?
Is the student can print the image in the final form?	Is the student can print the image in the final form?

Appendix 33: Examples of the observation results within the classroom.

Example (1) the observation results within the classroom(Arabic)

استماره ملاحظة في كل درس

اسم المجموعة: المجموعة التجريبية موضوع الدرس: أجزاء الكاميرا .

رقم الدرس: ١١

المهام	الملاحظات
وسائل التدريس المستخدمة	• كاميرا - حامل أوراق الصور - الطابعة • بروجيكتور تعليمية أو وسائل متعددة . • صور عن الكاميرا وأجزائها . • ..... • .....
طرق عرض الدرس	▪ التدريس الذاتي باستخدام البرنامج الحاسوبي ▪ تبادل الأدوار - التمثيل ▪ ~~عمل~~ تعليم الأقران ▪ .....
أساليب التقييم	❖ التقييم باستخدام الحاسوب (البرنامج) وسائل موت - كتابي - مهاراتي ❖ أجراء عمل كتابية ❖ ملاحظة تبادل الأدوار وإعادة الشرح . ❖ ~~.....~~ ❖ .....

2

Translation the Example (1) the observation results within the classroom(English)

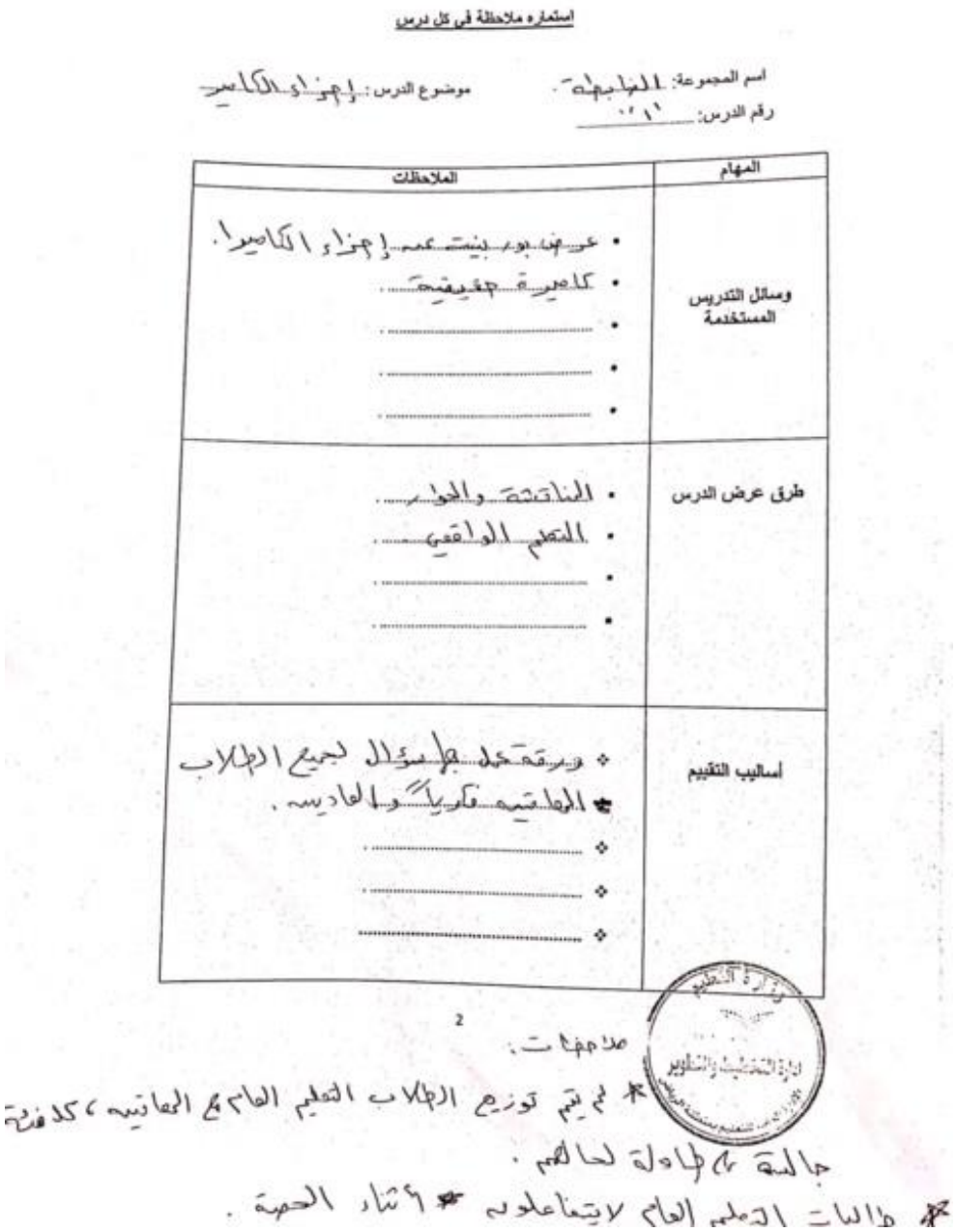
Application of Observation in Each Session.

Group name: … Experimental…….. The subject of lessens: The types of camera…….

Session Number: ……1.....

The teaks	The notes
Teaching aids used	1. ... Photos about the camera and parts of camera…… 2. ……Parts of real camera, as camera, printer and holder…….. 3. …… Cards or pictures for the part of camera …… 4. …… Interactive software …… 5. ……..……
Methods View of Lesson	1. … - Self-teaching using computer software…… 2. …… Peer tutoring ... 3. …… Exchange of roles and representation…….
Assessment methods	1. … Evaluation using the software (audio, written, multi-choice) ……. 2. …Written different worksheets for SID students and SNSEN students……. 3. … Evaluation by exchange of roles and representation ……

Example (2) the observation results within the classroom(Arabic)



استمارة ملاحظة في كل درس

اسم المجموعة: الطالبة.
موضوع الدرس: إحياء الكاميرا
رقم الدرس: ١٢

المهام	الملاحظات
وسائل التدريس المستخدمة	• عرض بور بوينت عن إحياء الكاميرا. • كاميرة حقيقية. • ..... • ..... • .....
طرق عرض الدرس	• المناقشة والحوار. • التعلم الواقعي. • ..... • .....
أساليب التقييم	❖ ورقة عمل بها سؤال لجميع الطلاب ❖ الطالبة فكرياً والعادية. ❖ ..... ❖ ..... ❖ .....

وزارة التعليم
إدارة التخطيط والتطوير

2

ملاحظات:

* لم يتم توزيع الطلاب التعليم العام في الحافلة، كل فئة جالسة مع طاولة لحالهم.
* طالبات التعليم العام لا يتفاعلون أثناء الحصة.

Translation the Example (2) the observation results within the classroom(English)

Application of Observation in Each Session.

Group name: … Control..... The subject of lessens: The types of camera…….

Session Number: ……1.....

The teaks	The notes
Teaching aids used	1. ... Photos about the camera and parts of camera……. 2. ……Real camera…….. 3. ……. Presentation by PowerPoint for camera parts…... 4. ……..……
Methods View of Lesson	1. … Realistic education……. 2. ……Discussion and collective dialogue ... 3. ……
Assessment methods	1. …Written different worksheets for SID students and SNSEN students…….

Nots:

1- Student distribution; SNSEN was at the table and SID students at the other table.
2- SNSEN students do not interact with SID students and they feel bored.

Example (3) the observation results within the classroom(Arabic)

استمارة ملاحظة في كل درس

اسم المجموعة: التجريبية

رقم الدرس: "٣"

موضوع الدرس: انواع الاجهزة الافتراضية

المهام	الملاحظات
وسائل التدريس المستخدمة	• العرض العملي بالحاسبة / • بطاقات. • برنامج فيديو موديل. • البرنامج التفاعلي. • مشهد تمثيلي.
طرق عرض الدرس	• مناقشة جماعية. • التعليم بالحاسبة/صوتي/كتابيا/ومهارات. • أسلوب الالعاب عن طريق الحاسبة. • النمذجة / التعلم الذاتي / العرض العملي /٢/ تحليل
أساليب التقييم	❖ كتابة تقرير عن الاداء. ❖ .... ❖ .... ❖ .... ❖ ....

2

وزارة التعليم
ادارة التدريب والتطوير

Translation the Example (3) the observation results within the classroom (English)

Application of Observation in Each Session.

Group name: … Experimental…….. The subject of lessens: The types of photographic…….
Session Number: ……3.....

The teaks	The notes
Teaching aids used	1. ... Presentation by PowerPoint for camera parts……. 2. ……Cards or pictures…….. 3. …… Audio video program …… 4. …… Interactive software …… 5. …… A representative scene ……
Methods View of Lesson	1. … - Self-teaching using computer software…… 2. …… Group discussion ... 3. …… Exchange of roles and representation…….
Assessment methods	1. … Evaluation using the software (audio, written, multi-choice) ……. 2. …Written different worksheets for SID students and SNSEN students……. 3. …Writing an expression of SID and SNSEN students views……

Example (4) the observation results within the classroom (Arabic)

استماره ملاحظة في كل درس

اسم المجموعة: الطالبات

رقم الدرس: "٣"

موضوع الدرس: أنواع الصور الفوتوغرافية

المهام	الملاحظات
وسائل التدريس المستخدمة	• البوربوينت عرض لأنواع الصور - (طابعة + بروجكتر ....) • .... • .... • ....
طرق عرض الدرس	• الحوار والمناقشة/الجماعية • .... • .... • ....
أساليب التقييم	❖ ورقة عمل لجميع الطالبات نوع التصوير بالصورة ❖ المناسبة ❖ التدريب ... ❖ مراعاة كتابة نوع الصورة ❖ ....

مراجعة الدرس السابق.

الطالبات ... تفاعل غير واضح ...

كان ... التعليم ...

إدارة التخطيط والتطوير

Translation the Example (4) the observation results within the classroom (English)

Application of Observation in Each Session.

Group name: … Control..... The subject of lessens: The types of photographic…….
Session Number: ……3.....

The teaks	The notes
Teaching aids used	1. ... Presentation by PowerPoint for camera parts……. 2. … Photos about the types of photographic …….. 3. …… 4. …… 5. ……
Methods View of Lesson	1. … Dialogue and collective discussion…… 2. …….. 3. ……
Assessment methods	1. … Use a worksheet with one question for all students SID and SNSEN. 2. ……..…… 3. ……..……

Nots:

1- The exercises are very easy for SNSEN students.
2- SNSEN students do not interact with SID students; only one student interacts during the course.
3- Two SID students were absent.

Appendix 34: Example: One of certificates of thank-to researcher to set up UDL workshop in the schools.

المملكة العربية السعودية
وزارة التعليم
مكتب التعليم بالبديعة
الثانوية٥٣

وزارة التعليم
Ministry of Education

رؤية 2030 VISION
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

شهادة شكر وتقدير

تشهد إدارة الثانوية ٥٣ بان المدربة / عهود سفر ألقت ورشة عمل التصميم الشامل UDL لمعلمات التربية الخاصة وتشكر على ذلك في يوم الأربعاء الموافق ١٤٣٨/٥/٢٥هـ

وفقها الله وسدد خطاها ،،،

قائدة المدرسة : [redacted]

وزارة التعليم
الختم
الثانوية (٥٣) مقررات
الإدارة العامة للتعليم بمنطقة الرياض

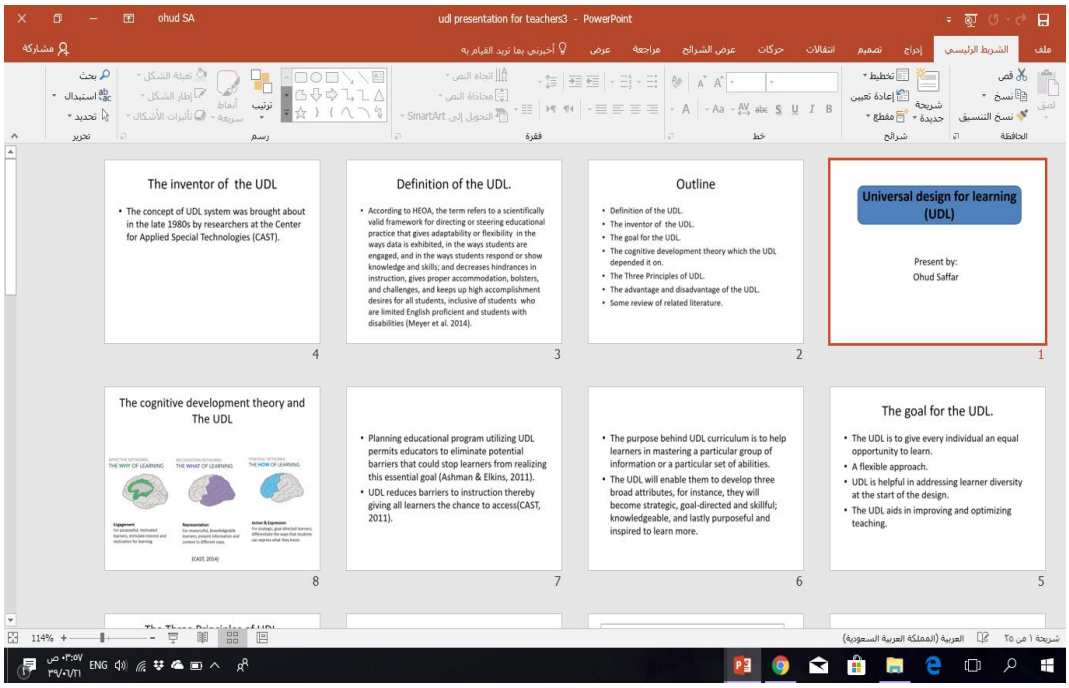
Appendix 35: Demonstrates the timetable and elements of the teachers training workshop

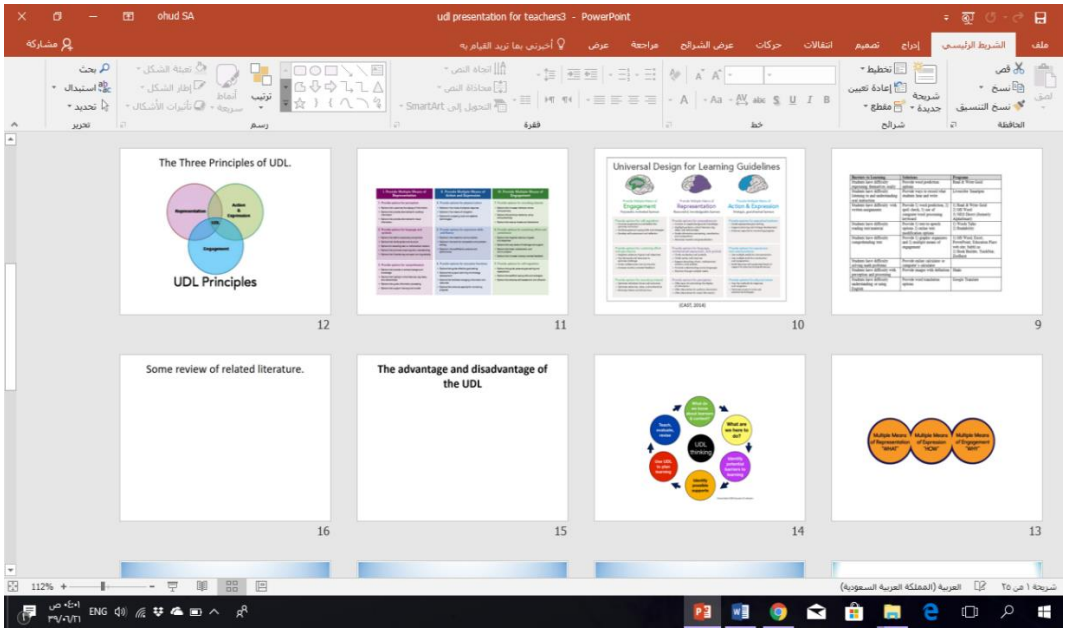
The theoretical content of the workshop:				
Goal(s) are covered	**Phase** ***Description for each part of presentation and activity that we plan to run in this training session.***	**Materials** ***What do we need to run the presentation or the activity?***	**Time** ***How much time is required?***	**What are participants doing?** ***Do, Reflect, Generalize, Apply***
Open and start the presentation	Slide 1: The title The facilitator introduced herself and the topic of the presentation	Power point slide	2 min	
Teachers' knowledge of UDL approach	The facilitator distributed the first questionnaire for teachers.	Questionnaire papers	10 min	Teachers answered the questionnaire
Presentation objectives or outline	Slide 2: Presentation overview The facilitator will emphasize the most important points that she is going to talk around them	The following key points have displayed on a Power Point slide: ▪ Definition and the goal for the UDL. ▪ The inventor of the UDL. ▪ The cognitive development theory which the UDL depended it on. ▪ The Three Principles of UDL. ▪ The application for the UDL with the students. ▪ The advantage and disadvantage of the UDL. ▪ Some review of related literature.	2 min	
Making connections between what they already know and new knowledge	Slide 3: activity 1 A question is posed: Think of what you know about the UDL approach?	"Opening question" on a PowerPoint slide	5 min	Taking a moment to reflect on their experience with the PowerPoint. Coming up with answers.

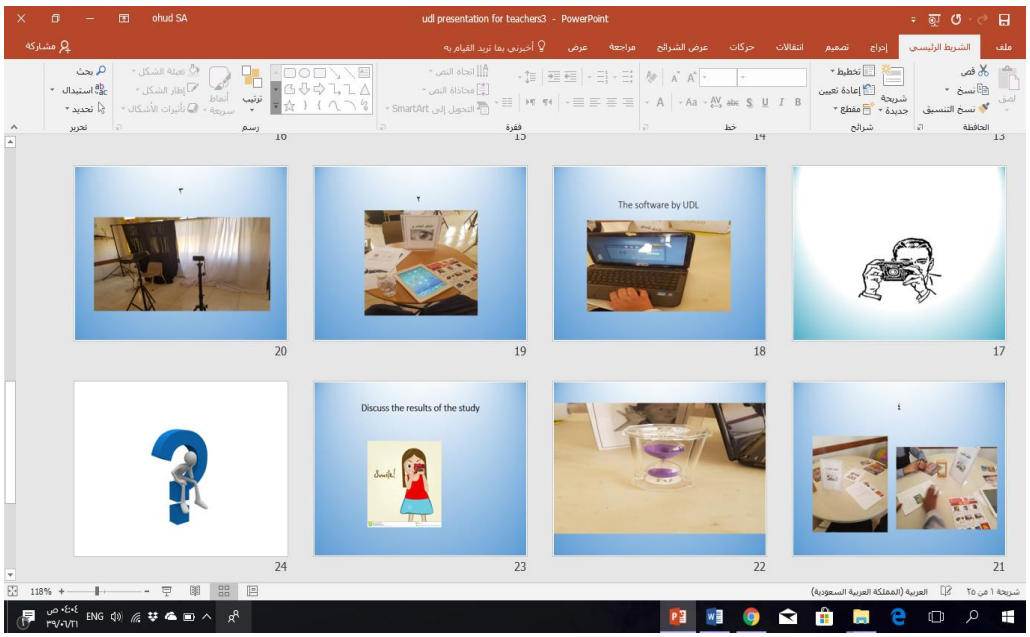
which they are exposed to	Ask a few members of the class for answers			
Trying to find out the definition of UDL	Slide 4: We have explained the concept and inventor of UDL	PowerPoint slide 	15 min	
The goal for the UDL	Slide 5: activity 1 Think of what you know about the goals of the UDL approach? Ask a few members of the teachers for answers	PowerPoint slide 	15 min	Taking a moment to reflect on their experience with the PowerPoint. Coming up with answers.
Element, Goal(s) and/or Indicator(s) ***Element(s), goal(s) and/or indicator(s) are covered.***	**Phase** ***Description for each part of presentation and activity that we plan to run in this training session.***	**Element, Goal(s) and/or Indicator(s)** ***Element(s), goal(s) and/or indicator(s) are covered.***	**Phase** ***Description for each part of presentation and activity that we plan to run in this training session.***	**Element, Goal(s) and/or Indicator(s)** ***Element(s), goal(s) and/or indicator(s) are covered.***
The cognitive development theory and the UDL	Slide 6: Videos The facilitator sequentially displays 2 diagrams describing the theory of the UDL.	PowerPoint slide http://www.cast.org/our-work/about-udl.html#.WoGqFegjTIV	10 min	
The Three Principles of UDL.	Slide 7: Videos The facilitator sequentially displays 1 video and 3 diagrams about principles and guideline of UDL.	Video (1) descript the UDL (5:00 min.) https://www.youtube.com/watch?v=jTesLcx3VmE Diagrams (1.2.3) The Three Principles of UDL. http://www.cast.org/our-work/about-udl.html#.WoGqFegjTIV	15 min	Open the space for questions and discussion to clarify unclear points.
The application or the steps for the UDL.	Slide 8: The facilitator explains the steps of the UDL	The application or the steps for the UDL.	Slide 8: The facilitator explains the steps of the UDL	The application or the steps for the UDL.
Coffee Break	Slide 9	Coffee Break 	Slide 9	Coffee Break

The advantage and disadvantage of the UDL	Slides 10 and 11: The advantage and disadvantage of the UDL The facilitator provides a brief description about the advantage and disadvantage of the UDL (Rose and Meyer, 2002; CAST, 2011; Hall et al., 2012).	The advantage and disadvantage of the UDL	Slides 10 and 11: The advantage and disadvantage of the UDL The facilitator provides a brief description about the advantage and disadvantage of the UDL.	The advantage and disadvantage of the UDL
Some of the research in terms of practical implementation of UDL	Slide 12: The facilitator explains some review of related literature to apply the UDL (Kumar and Wideman, 2014; Katz,2013; Corridor, Ganley, vue and Cohen, 2015; Alves, Kennedy, Meyer, Lloyd and Thomas ,2014).	Some of the research in terms of practical implementation of UDL	Slide 12: The facilitator explains some review of related literature to apply the UDL.	Some of the research in terms of practical implementation of UDL
Conclusion	Slide 13: The facilitator will: -Consider ending her speech by taking the audience back to the key messages -Thank the audience for their attention	Conclusion	Slide 13: The facilitator will: -Consider ending her speech by taking the audience back to the key messages -Thank the audience for their attention	Conclusion

Appendix 36: Illustrates the slides for the workshop of teachers training.






udl presentation for teachers3 - PowerPoint
ohud SA
The software by UDL
Discuss the results of the study

Appendix 37: General information for students**.**

		General Information for SID						General Information for SNSE					
		1	2	3	4	5	6	7	8	9	10	11	12
Teaching methods	The student prefers learning by visual types: pictures, video, computer and iPad.	*	*	*	*	*	*	*	*	*	*	*	*
	The student prefers learning by the audio recorder, an audio clip and .songs			*	*	*	*	*	*	*	*	*	*
	The student prefers learning by practical means: holographic and touch the reality materials.	*	*	*	*	*	*	*	*	*	*	*	*
	The student prefers learning by writing	*	*	*	*	*	*	*	*	*	*	*	*
The method of reinforcement	The student prefers physical reinforcement, such as games, pens ... .etc	*	*	*	*	*	*	*	*	*	*	*	*
	The student prefers symbolic reinforcement, such as stickers.	*	*	*	*	*	*	*	*	*	*	*	*
	The student prefers moral reinforcement, such as praise	*	*	*	*	*	*	*	*	*	*	*	*
	The student prefers social reinforcement, such as trips and playing with friends	*	*	*	*	*	*	*	*	*	*	*	*
Assessment methods	The student prefers using technology when writing homework, such as the Internet and e-mail.	*	*	*	*	*	*	*	*	*	*	*	*
	The student prefers to answer lesson activities and face-to-face.	*	*	*		*		*	*	*	*	*	*
	The student avoids answering in front of other students	*	*	*	*	*	*	*	*	*	*	*	*
	The student prefers participation in collective actions.	*	*	*	*	*	*	*	*	*	*	*	*

Appendix 38: Illustrates the performance of the teachers when using UDL**.**

The Three Principles of UDL	Lessons				
1. Provide Multiple Types of Representation:	**1**	**2**	**3**	**4**	**5**
Using a variety of types to present information (verbal, visual, auditory, tactile)	X	X	✓	✓	✓
Using multiple types to identify the essential concepts to help students understand.	X	X	✓	✓	✓
Providing information in alternative formats, such as diagrams, graphs... etc.	X	X	✓	✓	✓
Summarizing the lesson	X	X	✓	✓	✓
Using the caption, as materials	X	X	✓	✓	✓
Using digital or e-books based multimedia in teaching.	X	X	✓	✓	✓
Providing students with access to multimedia resources to support learning.	X	X	✓	✓	✓
The students use online resources and websites to learn.	X	X	✓	✓	✓
The students can use software to learn.	X	X	X	✓	✓
2.Provide Multiple Types of Action and Expression					
Using lectures as my primary teaching technique.	X	X	✓	✓	✓
The students work in small groups during lessons	X	X	✓	✓	✓
Using online assignments	X	X	X	✓	✓
The students study in groups outside of class	X	X	X	✓	✓
Communication with students online or face-to-face to discuss topics	X	X	✓	✓	✓
Designing class activities that match student interests	X	X	X	✓	✓
The students choose activities which match their interests	X	X	X	✓	✓
The students self-monitor their own progression	X	X	X	✓	✓
The students choose between multiple activities to accomplish tasks in class.	X	X	✓	✓	✓
3. Provide Multiple Types of Engagement					
Providing multiple types of assignments, such as writing essays, podcasts and video presentations.	X	X	✓	✓	✓
The student self-monitors their behaviour and learning outcomes.	X	X	✓	✓	✓
The student uses technology (e.g. laptops, tablets…..etc.)	X	X	✓	✓	✓
Providing multiple activities for students to show their knowledge.	X	X	✓	✓	✓

Providing an outline of the steps required to complete the tasks.	X	X	✓	✓	✓
Providing models or examples of class lessons and tasks.	X	X	✓	✓	✓
The students complete tasks in their own way.	X	X	✓	✓	✓
Providing clear guidelines to successfully complete all major tasks.	X	X	X	✓	✓
Identifying the scoring methods for all the main tasks before giving the students the tasks.	X	X	✓	✓	✓