HASS School of Education

University of Strathclyde

Glasgow, United Kingdom

The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia

By

Mohd Nazir Md Zabit

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Declaration

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Dedications

I would like to dedicate this dissertation to my wife, Tirzah Zubeidah Zachariah and my children, Danial, Demyan and Eian.

Mak and Ayah, Mami and Daddy for their Du'a.

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Abstract

This study is the first in Malaysia which focuses on the implementation of the Problem-Based Learning (PBL) method in the classroom within a Business Education course. The implementation aimed to enhance student critical thinking and achievement, which was investigated in the current study. Students' perceptions and experiences of PBL were also explored. The PBL model adopted from the McMaster's Model (Barrow and Tamblyn, 1980) comprised three major steps: (a) exposure to the problematic scenario, (b) search for information, and (c) discussion/new applications on the problems presented. PBL is operationally defined as an instructional strategy where students are faced with real issues which they have to solve through information searching and group. This study employed a quasi-experimental design, where forty five (45) students undertaking a Bachelor of Education (B. Ed Economics) were randomly assigned to the intervention (n = 23) and control groups (n = 22). The former were instructed using the PBL method while the control group still used the traditional learning method. Analysis focused on comparisons between the PBL and TL groups of their Critical Thinking skills [(Inductive, Deductive, Analysis, Inference and Evaluation and Total CT, as measured by the California Critical Thinking Skills Test (CCTST)] and academic achievement on Population Economics and Policy. Furthermore, PBL groups's perceptions were explored by a questionnaire. Results showed that there was no significant group difference in overall CCTST at pre-test and mid-intervention test, however differences were found at post-test on the Inductive and Analysis subscales. Regarding academic achievement, even though the two groups did not differ at pre-test, the PBL group showed higher scores at mid and post-test. Students' perceptions of the PBL method were generally positive despite some initial difficulties reported. Even though PBL required more time and effort, the students in the PBL group reported they managed to build their capacity for self-directed learning and improving soft skills. Implications of the study relate to how PBL can enhance students' critical thinking however this needs to be fostered by a whole programme approach rather than delivery via a single course.

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List of Abbreviations

1.	AAT	Academic Achievement Test
2.	ANCOVA	Analysis of Covariance
3.	ANOVA	Analysis of Variance
4.	APA	American Philosophical Association
5.	CCTDI	California Critical Thinking Disposition Inventory
6.	CCTST	California Critical Thinking Skills Test
7.	CGPA	Cumulative Grade Point Average
8.	CST	Creative Scientific Thinking
9.	CT	Critical Thinking
10.	DPLI	Diploma Pendidikan Lepasan Ijazah (Postgraduate Teaching Diploma)
11.	Ed. D	Doctor of Education
12.	F	Frequencies
13.	FPE	Fakulti Pengurusan dan Ekonomi (Faculty of Management and Economics)
14.	FPN	Falsafah Pendidikan Negara (National Education Philosophy)
15.	GSA	Students Generic Attribute
16.	HASS	Humanities, Arts and Social Siences, University of Strathclyde
17.	IPSI (SITC)	Institut Perguruan Sultan Idris (Sultan Idris Training College)
18.	KBSM	Kurikulum Baru Sekolah Menengah (Integrated Curriculum for Secondary School)
19.	KBSR	Kurikulum Baru Sekolah Rendah (Integrated Curriculum for Primary School)
20.	KEMAS	Jabatan Kemajuan Masyarakat (Department of Community Development)
21.	LCE	Lower Certificate of Education
22.	LPM	Lembaga Peperiksaan (Malaysian Examinations Syndicate)
23.	M	Mean
24.	MOE	Ministry of Education, Malaysia

25.	MOHE	Ministry of Higher Education, Malaysia
26.	MPM	Majlis Peperiksaan Malaysia (Malaysian Examinations Council)
27.	MyGuru	Online Learning Portal, UPSI
28.	NCREL	North Central Regional Educational Laboratory
29.	NSDC	National Students Consultative Council
30.	OBE	Outcome Based Education
31.	OPAC	Online Public Access Catalogue
32.	PBL	Problem-Based Learning
33.	PhD	Doctor of Philosophy
34.	PMR	Penilaian Menengah Rendah (Lower Secondary Evaluation)
35.	PPK	Pusat Perkembangan Kurikulum (Curriculum Development Centre)
36.	PSPTN	Pelan Strategik Pendidikan Tinggi Negara (National Higher Education Strategic Plan)
37.	SD	Standard Deviation
38.	SDL	Sell Directed Learning
39.	SPM/MCE	Sijil Pelajaran Malaysia (Malaysian Certificate of Education)
40.	SPSS	Statistical Programme for Social Sciences
41.	STPM/HSC	Sijil Tinggi Pelajaran Malaysia (Malaysian Higher School Certificate)
42.	TL	Traditional Learning
43.	TTCT	Torrance Test of Creative Thinking
44.	UPSI	Universiti Pendidikan Sultan Idris (Sultan Idris Education University)
45.	WGCTA	Watson-Graser Critical Thinking Appraisal

CHAPTER 1

INTRODUCTION TO STUDY

1.1   Introduction and Background of Study

Traditional education, including tertiary Business Education, has been criticized in terms of its lack of success in helping students develop habits of thinking, research skills, and problem solving abilities that will be vital in order to succeed (Dewey, 1944; Delisle, 1997; Lemke, 2001) and developing intelligences (Tan, 2007) in the ever changing world of the 21st century. Traditional learning (TL) is teacher-centred (Spence, 2004); the teacher would provide the student with the correct answer for various circumstances, and the student would be taught how to use this information as the teachers assign problems applicable for these answer. Some critics have commented that this traditional type of learning focused on discrete transmission which was considered to be important as well as the dissemination of specific pieces of information. A small judgment is granted to the practical value or applicability of information in the setting of real life. The curriculum also often does not reflect the real situation and is thus unable to facilitate the personal transformation and integration of knowledge and the understanding of the construction to the involved students. In order to support further the concept of TL, North Central Regional Educational Laboratory (NCREL) (2004), proposed that this nature of traditional teaching curriculum limits opportunities for and does not promote the construction of learning skills, communication skills, cognitive skills and collaborative skills. As such, essential professional and educational requirements are not met. This would be the common scenario in Malaysia as well. Most business educators are familiar with the more traditional teaching paradigm where they identify some content to be taught (Peterson, 2004). This type of instruction in higher education for the professions has been criticized for the lack of attention to particular issues such as the relevance of

subjects, little emphasis on encouraging teamwork, not fully developing skills of enquiry in students, and also for inadequate portrayal of the context of major issues and problem (Boud & Feletti, 1991, p. 15).

One of the goals of the Problem-Based Learning (PBL) is to increase students' active learning and decrease their experience of the passive learning that occurs in lectures (Armstrong, 1991). This study focused on PBL methodology and Critical Thinking (CT) skills, because CT is a basic to learning process (Phillips, 1997) and it also involves a problem solving process (Clarke, 1990). This method to improve students' CT skills gained attention from teaching and learning theorists, educators, policy makers and researchers because intelligence in the real world involves not only learning how to do things effectively but more importantly, the ability to deal with novelty and growing our capacity to adapt, select and shape our interactions with the environment (Tan, 2007). In order to master a curriculum that is both experiential and theory-based, students need to be assessed in early stages for academic readiness. Students also need to be prepared in foundational skills such as reading and CT skills before they embark on more demanding competency-based coursework (Wilson, 2009). Zaidi (2008) stated that all 20 public (government) universities in Malaysia seem to lack the capability to achieve this objective. Students only gain the knowledge but they are not taught how to become critical, imaginative and creative thinkers to implement the knowledge on how to analyse the situation and problem. Therefore, society should not blame the programmes offered but the medium of instruction. As such, it needs to be matched with the open market standard which focuses on specific skills like thinking skills and communication skills. Malaysian universities should give attention to traditional and philosophy based learning (known as inquiry or enquiry based learning) including PBL, hands-on, problem solving skills as well as creative and CT skills.

A leading Malay newspaper, Utusan Malaysia (2011), reported that employers often clearly state the required characteristics and the major requirements to ensure the balance of graduates which include the following seven elements: communication skills, CT and problem-solving skills, teamwork skills, learning and information

management, entrepreneurial skills, ethics and moral leadership and professional skills. Accordingly, the Ministry of Higher Education (MOHE), Malaysia has emphasized the infusion of Students Generic Attribute (GSA) or soft skills in the undergraduate program. The main objective for implementing this Students' Generic Attributes is to develop the soft skills among graduates.

Two issues which have been identified as important are the mastery of communication skills, particularly mastery of English and graduates who are not skilled in CT and problem solving skills. One of the concerns of the employers is that graduates seem to be incapable of giving their views and critical ideas. If they have given their views, then they are not able to master problem solving skills. They do not seem to be able find their way out of the criticism. The current issue arising is the problem of implementing these soft skills among the students. In fact, the implementation of soft skills among the students needs to be done on an integrated and systematic manner.

One objective of achieving the Pelan Strategik Pendidikan Tinggi Negara (known in English as National Higher Education Strategic Plan, PSPTN) is the aim of developing human capital with a first class mind (Nordin, 2011, speech). Nordin in his speech also mentioned:

> "…and through the Human Capital Development Plan which launched the Tertiary Level Innovation recently, it is intended to generate quality human capital development to drive the innovation and to transform the country based on innovation and creativity. These goals require the universities to generate outstanding graduates who can meet the requirements and hopes of the nation, who are not only knowledgeable and firmly grounded in knowledge potential but also possessing the special skills and the entrepreneurial spirit as required for the current workforce. The innovative country is not only economically motivated by innovation and technology but also by certain talents or skills".
> (p.4)

Those who possess this talent are the ones who can create the wealth and economic growth for the country. They are the intellectual powerhouse behind wealth creation and economic growth of the nation. Therefore, the universities play a role not only to produce graduates who have academic excellence, but also to produce the most talented graduates for the country with all the skills required for the 21st century. These skills are important for the country to compete successfully and collaborate globally (compete and cooperate) in an environment which is constantly exposed to diverse information.

As such, the development of talent among the students needs to show the characteristics inferred through the 5C's as a strengthening of the concept of soft skills module which was previously launched by the ministry. The five characteristics are:

a) Critical Thinking and Problem Solving,

b) Effective Communication Skills (communication effectiveness),

c) Collaboration and Team Building (can collaborate and work together with different groups including the views),

d) Creative and Innovative, and

e) Culturally Literate (literacy culture to move in a world of diversity).

(Nordin, 2011, speech, p. 5)

I believe that the students who have these five features meet the needs of the nation to compete for and deal with global challenges.

In this context, the universities should streamline all the terraced programs of study regularly to ensure the learning outcomes are on the right path. I believe that these initiatives are able to produce confident graduates who are grounded in knowledge, possess thinking skills and are able to address the problem, having articulate speech including communication in a foreign tongue, to apply ICT in a useful manner,

become sustainable entrepreneurs, skilled in sports, arts and civic engagement, be socially responsibility and possess moral and ethical values.

In addition, Nordin (2011, speech) also stressed:

> "…the time has come as in the next five years Malaysia educational systems would be shifting the paradigm of purely producing the human capital to enhancing the intellectual capital. Human capital development of the country would no longer depend on the question of only providing access, instead, efforts would involve developing the quality of experiences and knowledge received by a person or students at institution of higher learning. This is because the intellectual capital would be able to ensure the quality of development and ensure that it has become well established". (p. 6)

Strengthening the process of teaching and learning in higher education should also take advantage of technological advancement to make it more innovative, creative and attractive so as to attract the attention of students. Besides that, the characteristics of student learning should become more student-centered (or student-focused), because the process of this learning would be focused towards developing the aspects of students development and a comprehensive potential. According to Radin Omar (2011), the focus of the teaching and learning at tertiary level would be towards producing functional graduates. The target has been placed to increase the percentage of graduates in the available jobs six (6) months after graduating from 74.1% to 78%. For that, all universities would focus on strengthening student-centered learning approaches such as: Outcome Based Education (OBE), PBL, Modular Approach and Case Studies in order to transform the students to outstanding individuals.

However, in Malaysia according to Sulaiman (2011), the material is limited because of the lack of research relating to this methodology and lack of research documentations. There are various materials which relate to PBL and CT skills

(Chin & Chia, 2000; Neo & Neo, 2001; Juremi, 2003; Ward & Lee, 2002; Kivela & Kivela, 2005; Tan & Ng, 2006; Awang & Ramly, 2008; Yuan et al, 2008; Sulaiman, 2011; Masek & Yamin, 2012). In Malaysia, the PBL method is only being practised at higher institutions of learning, and it is limited to certain fields like medical, nursing, science, technology and engineering.

1.2   Professional Context of the Study

In selecting this particular field of research, the researcher also has been influenced by his own learning and teaching experiences in Malaysia as an undergraduate student (1993-1997) and as a lecturer at Seberang Perai Polytechnic, MOHE since 1998 until 2004 and Sultan Idris Education University (UPSI) since 2005 to present. Currently, I teach Business Education courses to pre-service teachers on the Bachelor of Education (B. Ed. in Economics), Bachelor of Education (B. Ed. in Business Management) and Bachelor of Education (B. Ed. in Accounting) and the study may influence how other lecturers teach pre-service teachers in terms of implementation of PBL in lecture rooms and may contribute to better understanding of effectiveness of PBL on student CT skills in universities especially in Malaysia.

The debate over the quality of Malaysian higher education among the graduates of Business Education could be symbolized by the critical feedback given by a prominent historian and local academician, Emeritus Professor Dr. Khoo Kay Khim who said the current education system causes significant problems in assessing the quality of graduates. He argued that the lecturers and educators should not inform the students or provide tips of what would come out in the examination or how they should answer these questions; the students will have to think of the problem for themselves (New Straits Times, 2008).

Khoo further maintained that even though at the university, the students hope that the lecturers always tell them what topics or issues that they need to learn, and then what sort of questions would come out, and how they could answer back in the tests. He also added;

"... a majority of new young lecturers frequently stuck in this instance and then inform the students of what they need to know, partially in an attempt to become popular. I was also approached by the students, and then, I told I did not know, I stated so as I believe the students should learn everything". (New Straits Times, 2008)

Khoo also said that even at schools, some teachers refused to teach the entire syllabuses which have been prepared by the relevant authorities with the hope that the students will be attending classes or tuition outside the school, and they also offer the examination tips.

As a result of these experiences, the researcher came to hold the view that the teaching and learning of Business Education at undergraduate level is not satisfactory across Malaysia. From my understanding, to remain competitive in these times of changing educational needs, Malaysia must generate high value-added capabilities of higher instituitional graduates. As such, education institutions, including higher education institutions must provide confident students who can act to solve a problem, and then make a good decision. These students must have CT skills.

Therefore, to provide students with this character, educational institutions must change their paradigm from the memorizing culture (rote-learning) to focus on application, synthesis, knowledge evaluation and thinking skills. In Malaysia, rote-learning is a typical method of learning and students are taught familiar or well-known methods which are used to solve problems related to Business Education, as outlined in subjects like Commerce, Economics, Accounting, Hospitality, Entrepreneurship, Management and so on. The government has identified human capital development as the most critical element in achieving its Wawasan 2020 (as known in English as Vision 2020). In other words, the concept of human capital needs to be expanded to include intellectual capital. All relevant core knowledge and skills should be imparted step-by-step at each stage of the education flow pathway right through from pre-school to tertiary level built up in a logical manner. Human

capital development encompasses a holistic acquisition of knowledge, skills and attitude, complemented by soft skills capabilities. Soft skills or generic skills refer to the cluster of personality traits, social graces, language proficiency, personal habits and team work. Accordingly, the MOHE, Malaysia, has explicitly identified and encouraged the use of seven elements of soft skills: communication skills, problem solving and thinking skills, continuous learning and information management skills, working in group skills, leadership skills professional ethics and entrepreneurship skills (Utusan Malaysia, 2011) through all bachelor degree programmes since 2007 (Mohd Majid et al, 2008). This has placed me in the position as an observer to evaluate the implementation of PBL to encourage students' CT skills through Business Education courses.

1.3   History and Teaching Approach for Business Education in Malaysia

In Malaysia, the teaching and learning of Business as a subject (for example Commerce, Economics, Accounting, Hospitality, Entrepreneurship and Management) begins at the secondary level of the school system (known as Form 1 in Malaysia, or after 6 years in primary school level). The introduction of Business Education subjects or better known as vocational subjects has been designed and enriched with the skills that will lead to the area which could provide opportunities for students to engage in the employment world after school. Vocational subject goals were aimed to produce students;

   "…skilled in the relevant and meaningful areas of endeavour in
   order to allow them to find a job, start a business or to continue to
   a higher level of training..." (PPK, 2003).

From Form 1 to Form 3 level (at age 13 to 15 years old) students explore the principles of business subjects (i.e. Commerce and Principles of Economics). After completing the Lower Certificate of Education (LCE) or Lower Secondary Evaluation (Penilaian Menengah Rendah, PMR) at age 15 years old, they will be

split into five major groups of streams; Art, Science, Technical and Vocational, Economics and Business, and Islamic or Morale Studies. In Economics or Business streaming, the students will study and learn three main subjects individually; Accounting, Business Management and Economics. After completing the Sijil Pelajaran Malaysia (SPM) (formerly known in English as the Malaysian Certificate of Education (MCE)), conducted by the Lembaga Peperiksaan Malaysia (LPM) (known in English as the Malaysian Examinations Syndicate) at about 17 years olds (Form 5) (equivalent with GCE O-Level) , students have a choice either to pursue the Matriculation level (1 or 2 years length), Diploma (3 years) or Sijil Tinggi Pelajaran Malaysia (STPM) (formerly know in English as the Malaysian Higher School Certificate (HSC)), conducted by the Majlis Peperiksaan Malaysia (MPM) (the Malaysian Examinations Council) (equivalent with GCE A-Levels). The STPM or HSC is taken by students after a two-year sixth form course and it is accepted for admission to universities worldwide. At this level, the students will have a chance to learn and study business subjects deeply including Accounting, Business Management, Economics, Statistics and Mathematics for Business.

The "chalk and talk" method was the main teaching approach used by lecturers to overcome the problem of many students in one class and having to finish the syllabus (Becker & Watts, 2001). Lecturers play a role as a catalyst in implementing Business Education in the university in Malaysia. In preparing to teach, the lecturer should make a detailed plan before starting the lesson. He or she should analyse the teaching material and then select, improve and organise the activity and suitable examples to fulfil the lesson objectives. The planning component is important to enable the lecturers to prepare suitable teaching aids, improve the lesson content and decide the teaching and learning strategy based on the students' needs and ability. The teaching and learning process for PEA 3063 – Population Economics and Policy is made up of three phases which are;

a)   the pre-teaching or induction set,

b)   the lesson development and

c)   the closure.

1.3.1 The pre-teaching or induction set

This is a component in the pre-teaching which aims to encourage flow of thoughts and to create student interest so that they can focus on the lesson content. The usual method for induction set is by using teaching aids, applying situations, motivating students, questioning, using stories, stimulus, recalling back previous topics, revising related topics and brainstorming.

1.3.2 The development phase

The purpose is to enable the teaching and learning process to occur systematically and effectively. In this phase, the lecturers will conduct teaching and learning activities with the suitable strategy and method. The methods usually used are the overall lecture method, group work, question and answer, explanation, lecture, problem solving and demonstration.

1.3.3 The closure phase

The purpose is for making conclusion and summary in a particular lesson topic. The component of closure comprises follow-up activities, evaluation, learning objectives, making summary or conclusion and modification in the next lesson. Before ending the lesson, lecturers should also conduct assessment activities to measure how far the learning objectives have been fulfilled.

Based on the above phases, the researcher viewed that the teaching and learning of Business Education course in Malaysia is still based on the teacher-centered approach. The students, including those at the tertiary level still expect input and learning outcomes in the lecture rooms, tutorials, materials and notes from the teacher or lecturers. The approach of teaching and learning methods like this may be less stimulating to the students in order to develop habits of thinking, research skills, and problem solving abilities that will be vital in order to succeed. This will affect

the next generation of Malaysian human resources as they will become passive and less aggressive in communicating, sparking new ideas and innovation, but also remain in doubt to make informed decisions independently.

The research problem is more fully explored in Chapter 3 – Justification of Research Problem and Methodology.

1.4   The Structure of the Dissertation

This dissertation is organized into seven chapters. Each chapter begins with a chapter overview, in order to help readers understand the flow of ideas presented. A brief outline of each chapter follows;

Chapter 1: Introduction to Study. Presents the context and origins of the study – setting out the reason why this study is currently the focus of the researcher's attention and interest.

Chapter 2: Literature Review and Terms of Reference. The literature review consists of a review of relevant literature of theories of learning, PBL, problem solving, and CT. It will present the learning dimension, which is the students' learning process in Business Education. The PBL dimension - PBL models from previous research which were used in this dissertation; the thinking models; and also the conceptual frameworks are presented here.

Chapter 3: Justification of Research Problem and Methodology. This chapter presents the research problem, research aims, objectives and purposes. This chapter will also discuss the rationale and importance of research, research questions, research hypothesis and limitations.

Chapter 4: Methodology. Presents the methodologies used in the inquiry including a description of the characteristics of educational research, research design, and research activities. This chapter also describes the development of all instruments

(questionnaires, test questions, and open-ended questionnaires) used in this inquiry, followed by a description of the data collection strategies employed. The data analysis procedures are presented along with a discussion of the measures taken to maintain the trustworthiness of the inquiry. This chapter concludes with consideration of the ethical issues relevant to the inquiry.

Chapter 5: Research Findings. Presents the results of the data collection based on the questionnaires, tests, and interviews.

Chapter 6: Discussions. Present a discussion and elaboration of the findings from the previous chapter.

Chapter 7: Conclusions, Implications and Recommendations. This chapter considers the implications of the study for teaching and learning and makes some suggestions for further study. The chapter ends with overall conclusions for the dissertation.

The next chapter presents a review of literature about of theories of learning, PBL, problem solving and CT skill.

CHAPTER 2

LITERATURE REVIEW AND TERMS OF REFERENCE

2.1   Overview

This chapter aims to provide an overview of the literature supporting PBL as the teaching and learning approach used in this study. This chapter is divided into six (6) main sections and a few subsections. The first section describes the learning theories and this is followed by a discussion of PBL in detail. The PBL discussion includes literatures regarding its successful implementation in practice and education. The next focus would be on a discussion of CT skills and also literature on the relationship between CT skills and PBL. The last section provides a review of issues arising from the CT skills implementation before ending with the chapter conclusion.

2.2   What is learning?

There exists a gap between policy makers, educationists and educational practitioners in agreeing on the preferred learning process for students. In Western nations such as Republic of Ireland, and even United Kingdom itself, proponents of educational theories seem to be fighting a tired battle with regards to the professional educational policy, particularly in teacher education programmes and informal education. This constraint has created certain perceptions in the community that the resolution and the accuracy of the administration of the learning approach can be reliably measured or assessed by various means. According to Nuy and Moust (1990), our attitude towards learning is consistent with traditional values and principles. Learning is considered as the process by which we acquire knowledge, skills and good values.

Cepni and Keles (2006) also commented on the same matter where the literature indicates the nature of learning or the complex learning process.

As a measure to further support the concept of learning, this view is supported by Van Gyn and Grove-White (2005), through modern Learning Theory which assumes that the learning process occurs based on historical experience which will then generate relatively permanent changes in the students' knowledge and thinking. The student can learn only from personal experiences; therefore, learning and knowledge cannot exist apart from a person. A person's knowledge is a result of experience, and no two people have had identical experiences. Even when observing the same event, two people react differently. They learn different things from the same event, according to the manner in which the situation affects their individual needs. This is because previous experience conditions a person to respond to some things and to ignore others. These effects eventually create a difference in the students or performers. As human beings, we are capable of studying independently. The theory of meaningful learning is associated with the work of Ausubel (1963) and developed by Woolfolk (1998). In this theory, ideas are in the form of language, and the relationships between these ideas are crucially important. For learning to be meaningful, connections must be made between new information and existing knowledge. By contrast, rote learning was not regarded as meaningful since the material learned does not have to reflect on the distinguishing feature ; in Ausubel's view, rote learning is not connected with existing knowledge and it is merely memorised in a mechanical fashion to show that meaningful learning is better compared to reception learning. Rote learning occurs when the learner memorizes information in an arbitrary fashion. The knowledge or information is stored in an isolated compartment and is not integrated into the person's larger cognitive structure. "Rotely learned materials are discrete and isolated entities which have not been related to established concepts in the learner's cognitive structure" (Ausubel, 1962 p. 215-216), because rote learning is not anchored to existing concepts, it is more easily forgotten. This is true only if you keep in mind that meaningful learning is very connected to the process of knowledge retention within cognitive structures. Rote memory works at times for short term memory as we know from casual

meetings with new people and exposure to a new joke. But the knowledge can only be effectively retained if it is meaningful, and thus must be processed in a way that it can be subsumed and anchored in the mind. According to Ausubel (1963), the information learned in a more meaningful way can be assimilated into the existing cognitive structure. This cognitive structure is the existing knowledge which consists of the fact, concepts, and generalization that have been learned by the students. Ausubel further emphasizes that via this type of learning, any information to be learned becomes meaningfully memorable for a longer time compared with what has been learned by rote learning. This is in line with Novak (1993) who states that when a student memorises some information by rote, the information can only be stored for a short term period. The memory can process an amount of about seven or so pieces of information or items from the information of items that had been learned or found. Novak (2010, p. 507-13) also stated that meaningful learning underlies the constructive integration of thinking, feeling, and acting leading to human empowerment for commitment and responsibility

According to Van Gyn and Grove-White (2005), the proponents of the learning theory believe that learning could both be increased or accelerated as it could be directed to the people in the learning process through the observation of the students to what is right and what is usable as the learning process occurs. This is in line with Gurrie's study (2003). Van Gyn and Grove-White (2005) further comment that working alongside students is the essence of the modern educational system, but the theory of what is applied or how to function may depend on social factors, politics, economics and culture where the learning takes place. Besides the generalization of learning, Prosser and Trigwell (1999) further stress on the dynamic and interactional nature of approaches to teaching. This can be described as halfway between a teacher-focused conception (with a content orientation) and a student-focused conception (with a conceptual development orientation). The learning experience is not static. The student does not necessarily always do the same thing when engaged in learning. Furthermore, different students will employ different learning strategies or 'approaches' at different times. Numerous studies into these approaches to learning have now been conducted across a range of disciplines. It is, however,

unlikely that a sophisticated conception of teaching would have any straightforward relationship to the teaching methods and strategies adopted (Entwistle, 2003). Rather, Enwistle also explains;

> "…there could be many possible ways of translating that type of thinking about teaching and learning into practice, as the university teacher took account of the nature of the intake and stage the students had reached".   (p. 4)

Entwistle et al. (2001) also develop in close conjunction with thinking regarding the nature of the subject being taught. Additionally, the authors also describe that the influences on the choice of teaching approaches adopted are clearly more complex than any simple analytic model can convey.   According to these authors, approaches to learning are not individual characteristics in a simplistic sense as the approaches result from personal experience. The constructs are influenced by teaching, assessment and learning context. Furthermore, according to Entwistle et al. (2001), approaches to learning can be generalised, but they also require specificity considering the way they behave in different situations.

2.3   What are Learning Approaches?

In the field of psychology and education, learning theory can be applied to studies pertaining to both humans and animals. Learning includes the psychological constructs that will provide a preference to the individual to the approach of learning in a certain way. These processes may enable us to understand the complex learning. In the 1960's and the 1970's, learning could be seen as the change in behavior, in which it was assumed to be connected between the actions and causes. It is also observed as the approach which focuses on the importance of changing with aspects.

As questioned by Merriam and Caffarella (1991):

a)   Does a person need to perform in order for learning to have happened?

b) Are there other factors that may cause behaviour to change?

c) Can the change involved include the potential for change? (p. 124)

According to Smith (1999), the experience and knowledge should be used in various ways if we prefer to say that the learning has happened. Smith's (1999) point of view has been addressed previously by Ramsden (1992), where many theorists do not care about the occurrence of learning of behavior, but they believe that the change is made possible through the experience or by the understanding of the meaning and the concepts of world around us. To simplify this process, it means that we as human beings would acquire the knowledge, skills and capabilities through our previous experience.

In this regard, Ramsden (1992) reflects on adult learning as a repetition of what we have experienced, within circumstances which varies between individuals. He has identified five (5) ways to define the learning process namely:

a) Learning as a quantitative increase in knowledge. Learning is acquiring information or 'knowing a lot'.

b) Learning as memorising. Learning is storing information that can be reproduced.

c) Learning as acquiring facts, skills, and methods that can be retained and used as necessary.

d) Learning as making sense or abstracting meaning. Learning involves relating parts of the subject matter to each other and to the real world.

e) Learning as interpreting and understanding reality in a different way. Learning involves comprehending the world by reinterpreting knowledge (p. 26).

Ramsden (1992) distinguishes between concepts (d) and (e) on the one hand, which he sees as qualitatively different from concepts (a, b and the c) on the other. Concept (a) and concept (b) describe learning in terms of the amount of information stored in one's memory particularly where the new information being acquired is unconnected with their existing knowledge. As understood from concept (a), this includes all the probable learning by the students based on what has been done by the teachers or simply because it assumes that learning is similar to going shopping (for example, students go out and 'buy' knowledge - it becomes theirs). We have or obtained what is expected based on our ability. From these statements, we can look to the personal or internal aspect of learning or we can conclude that gaining knowledge here is seen as something that you do in order to understand the real world.

It has been identified earlier that the last two conceptions (d and e) can be viewed as an internal process or more explicitly how a person learns something. The process to gain knowledge or experiences could be assumed as a process in which students understand the world or express what they know about the world. As proposed by Ryle (1949) the difference in the learning processes are known as "knowing that" and "knowing how". The categories (a and b), partly involve "knowing that". As we move to the category (b), we see that alongside "knowing that" there is more emphasis on "knowing how". As pointed out by Ramsden (1992), the students imagine the process of learning as a reality to understand knowledge. "In other words, students who conceive of learning as understanding reality are also able to see it as increasing their knowledge" (Ramsden, 1992, p. 27), it is also described as an increase in particular skills.

The common features of what is currently seen as a powerful learning environment based on suggestions by De Corte (2000) and De Corte et al (in press), when looking through the innovations at Belgian education. It should:

a)   include group discussions of both the content and the process of learning and studying;

b)   provide authentic tasks and realistic problems that have personal meaning and future use;

c)   initiative and support active and constructive learning processes (conceptual understanding);

d)   enhance students' awareness of their own cognitive processes and their ability to control their motives and feelings (cognitive and volitional self-regulation).

2.4   Theories of Learning

2.4.1   The Behaviourist Theory

The theorists who introduced this theory include Thorndike, Pavlov, Watson, Guthrie, and Hull. They argue that this type of learning refers to a 'stimulus-response", for example, the behavior we produce out of awareness or consideration, or stimulated by the environment. In a learning process, teachers or educators would act to change their behavior and human behavior. The students will act or provide feedback according to the external environment stimulation. The students will attempt to adapt to their environment and this action requires the teacher or educators to manipulate the factors in the environment to allow the reaction by students as required.

We can agree to or argue that students developed skills and knowledge through further training or repeated action. These activities have all occurred in learning. In the current context, this type of learning could be assumed as rote based learning, feedback, prescriptive, direct instruction, such as lectures, ability or competency based educational or learning based on the final results. This kind of learning has been referred to as classical conditioning (Pavlov, 1930), stimulus-response (S-R); and operant conditioning (Skinner, 2002).

2.4.2 Humanist

As informed by DeCarvalho (1991) and Huit (2001), this learning theory was originally proposed by Maslow and Rogers. This theory stresses that the learning process is seen as a personal act and it is used to fulfill the potential of learning and self-actualization. We could be claim that the Humanist approach includes paradigm, philosophical and pedagogical methods, and it is assumed as realizing the action or behaviors of learners as a personal action with the intention to fulfill their potential.

In this learning theory, students would learn personally or self directed where the teacher or lecturer only act as a facilitator for the students to produce and to develop ideas. Through this theory, the teacher facilitates learner improvement and development as a whole person and the students are given autonomy in making the decisions based on what they have learned. This is consistent with the main goal of this learning theory, where the learning would help the students to realize what they will and have been learned. The main objective of the Humanist approach is to help the learner to become self-actualized, autonomous and independent in everything that they have learned. Perhaps the best known example is Abraham Maslow's hierarchy of motivation. At the lowest level are physiological needs, at the highest self actualization. Only when the lower needs are met is it possible to fully move on to the next level. A motive at the lower level is always stronger than those at higher levels. Tennant (1997) summarizes these as follows:

a) Level one: Physiological needs such as hunger, thirst, sex, sleep, relaxation and bodily integrity must be satisfied before the next level comes into play.

b) Level two: Safety needs call for a predictable and orderly world. If these are not satisfied people will look to organize their worlds to provide for the greatest degree of safety and security. If satisfied, people will come under the force of level three.

c) Level three: Love and belonginess needs cause people to seek warm and friendly relationships.

d) Level four: Self-esteem needs involve the desire for strength, achievement, adequacy, mastery and competence. They also involve confidence, independence, reputation and prestige.

e) Level five: Self-actualization is the full use and expression of talents, capacities and potentialities.

Self actualizers are able to submit to social regulation without losing their own integrity or personal independence; that is they may follow a social norm without their horizons being bounded in the sense that they fail to see or consider other possibilities. They may on occasion transcend the socially prescribed ways of acting. Achieving this level may mean developing to the full stature of which they are capable (Tennant 1997, p.13).

2.4.3   Situational or Social

This theory is often seen as a bridge among the behaviorist and cognitive learning theories because it includes attention, memory and motivation. Social learning theory by Bandura, for example, states that people learn from each other, by observation, through imitation or modeling. Bandura, Lave, Wenger and Salomon are the main proponents of the social and a more radical model 'situated learning' has been put forward by Lave and Wenger (1991).

The learning process here is seen as a certain social interaction and observation of the context. The locus of learning is to engage in relations 'between the people and environment', and the learning objective is to assist students to become fully involved participants in the 'certain practices of society'. According to Lave and Wenger (1991) the nature of the situation impacts significantly on the process:

Learners inevitably participate in communities of practitioners and the mastery of knowledge and skill requires newcomers to move toward full participation in the socio cultural practices of a community. "Legitimate peripheral participation" provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artefacts, and communities of knowledge and practice. A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a socio cultural practice. This social process, includes, indeed it subsumes, the learning of knowledgeable skills (p. 29).

The main task for educators or teachers is to establish the practice of communities, in which conversation and the full participation can take place. Learning can be viewed as a result of socialization, social participation, association and the conversation with other people. This is supported by Tennant (1997):

"…learning is part of daily living. Problem solving and learning from experience become central processes although situated learning is not the same as 'learning by doing'" (p. 73).

To sum up, these views involve contrasting ideas as to the purpose and process of learning and education - and as a consequence the role that educators may take, and is not related to PBL characteristic. This is due to this learning theory not emphasising the embedded nature of learning in social contexts and not addressing explicitly awareness of one's own learning processes as demanded by the idea of learning how to learn, although it does involve people and the environment, and full participation in communities of practice and utilization of resource.

The next sub-section elaborates in depth on constructivist or cognitive practice and theory. As noted below, PBL is 'situated' in the constructivist or cognitive perspective of learning.

2.4.4   Social Constructivist

Constructivism is an epistemology and as stated by John Dewey (1916), he believed that education depended on action and he also claimed that education should relate to real-life experience. Dewey further elaborated that knowledge and ideas only emerged from a situation in which the learners had to draw them out of experiences that had meaning and importance to them. According to Schunk (2000), this perspective is closely associated with many contemporary theories, especially the developmental theories by Vygotsky (1978) and Bruner (1996), and social cognitive theory by Bandura (1986). Additionally, Vygotsky (1978) places more critical emphasis that constructivism is a doctrine stating that learning takes place in contexts, and that learners form or construct much of what they learn and understand as a function of their experiences in situation and interact with people (other learners and teachers). The theory by Vygotsky was referred to as "social constructivism" (Maddux et. al., 1997).

As regards to the cognitive approach, this emphasizes the internal mental processes and identifies four main stages: sensorimotor (infant-2 years), preoperational (2-7 years), concrete operational (7-11 years) and formal operational (11 years and above) (Satterly, 1987). The information received could be processed through the selection, comparison and integration with other available information in memory. The consolidation of this information then will be changed and reorganized. The result of thought depends on the internal mental process. Cognitive psychologists such as Koffka, Kohler, Lewin, Piaget, Gagne and Ausubel emphasize that we are not the passive recipient of a stimulus. On the other hand our brain would actively process the information that is received and convert the information to a new form or categories.

This group of Western psychologists has identified the mental foundation which they believe share a relationship with people's cognitive development. They suggest that the mind plays an important role in aspects of growth experienced by people. Jean Piaget is the main expert on constructivism (Donaldson, 1984; Satterly, 1987) and the main idea of constructivism is the mental representation. In this learning theory,

all ideas and images in the minds of individuals are represented through cognitivism of mental structure to be known as the schema. The schema represents knowledge about concepts; objects and the relationships they have with other objects, situations, events, sequences of events, actions, and sequences of actions. This schema would determine how the data and information becomes consistent with the existing scheme and the students will absorb this information into this schema. If it is not consistent with the existing schema, this information may be declined or the schema will be adjusted.

A cognitive approach from the ideas of cognitivism is the constructivist approach. According to the constructivist view, knowledge is constructed by the students who actively think. These students do not passively absorb any knowledge that is presented by his teacher; instead, the student will customize any new information with their existing knowledge to create the new knowledge in mind with the assistance of social interaction with peers and teacher.

The theory of development has provided some guidance for teachers and the parents about the development experienced by a child. Each child is different in terms of cognitive development and this is likely influenced by other factors such as genetic, environment, food, age, intelligence and so on. This hands-on-project base approach provides opportunities for students to learn how to use tools based on the diversity of cognitive science disciplines. Educational practical and practices in this approach includes PBL, inquiry and discovery learning, collaborative and cooperative learning, participatory and active learning, dialogical and activity process, anchored instruction, and cognitive scaffolding (apprenticeship).

As elobarated above, PBL is included in the constructivist or cognitive dimension of learning. According to Brooks and Brooks (1999):

> We realize that the nature of questions posed to students greatly
> infuences the depth to which the students search for answers.
> Posing problems of emerging relevance and searching for windows

into students' thinking form a particular frame of reference about the role of the teacher and about the teaching process. It cannot be included in a teacher's repertoire as an add-on. It must be a basic element of that repertoire (p. 44).

Additionally, Wilkeand and Straits (2001) labels it as inquiry learning, which includes PBL, which they further define as learning occurring:

"...when the learner constructs an understanding of new information by associating it with prior knowledge in an organized and systematic way. Within this context, inquiry learning is student-based exploration of an authentic problem using the processes and tools of the discipline and as such, is an excellent way of teaching factual information and more importantly, process skills" (p. 2).

This is supported by Achuonye (2010) who stated the strength of constructivism lies in its emphasis on learning as a process of personal understanding and the development of meaning in ways which are active and interpretive. This good evidence shows that PBL represents how people deal with real life problems in society by working with peers to take the initiative, solve problems and make effective thoughtful decisions.

In the next section, the researcher will explain and discuss on how the previous findings and literature suggest the potential of PBL to encourage and enhance learning.

2.5   What is PBL and what benefits might be expected?

PBL is not a new phenomenon. According to Boud and Feletti (1991), PBL is a methodology that was used before the formal classroom concepts are introduced. PBL curriculum as a core in this research was introduced by Howard Barrows (medical education programmes, McMaster University, Canada) in the early 1969. The origin of PBL can be traced to the progressive movement, especially to John Dewey's (1944) belief that teachers should teach by appealing to the students' natural instincts to investigate and create. This learning approach has spread to medical schools in North America, Europe, and Australia in the early 1980's and has been adopted by schools of engineering, architecture, social work, law, nursing, and among others (Boud & Feletti,1997).

According to the McMaster model (Barrows & Tamblyn, 1980), the concept of the PBL method involves three phases which are:

a)   revealing the problem scenarios,

b)   finding information, and

c)   discussion and new knowledge application to the problems.

The PBL method stresses that problem solving activities are a style to gain and to apply knowledge (Barrows & Tamblyn, 1980). It is becoming an increasingly popular term in tertiary education and was first applied in business schools (Kwan, 2000), as more and more educational disciplines implement the teaching and learning approach associated with the terminology, previously believed to be monopolised by medical schools. This learning approach applies widely to learning in most professional schools and disciplines. In fact, some argue that it is the most significant innovation since the move of professional training into educational institutions (Boud & Felletti, 1997).

According to Barrows and Tamblyn (1980), PBL is defined as the learning that results from the process of working towards the understanding or resolution of a problem. On the whole, Business Education programs normally use the traditional business curriculum structure produce one tier teaching method which is the traditional teacher-centred approach such as lectures and tutorials. The knowledge of business subjects is disseminated via lectures in business coursework classes. Instructors periodically give lectures and by the end of a study session or semester, the assessment of students' performance is made, mainly based on examination. Barrows and Tamblyn (1980) regard this as an important step in which students recall what they already know about a topic, to give them a context for learning (Norman & Schmidt, 1992; Schmidt, 1983). The current Business Education system has seen some variations in modes of performance assessment of business coursework. This is usually limited to case study, report submission and presentations which do not depart from teacher-centred approach.

In the PBL approach, according to Flint (2007), typically 5-8 students work together in a group. Active discussion and analysis of problems among students enable them to: learn from each other; apply content knowledge to a practical real world problem; learn and practise both individual and group communication skills; evaluate the learning and discovery process they used to achieve their goals and solve the problem. According to Alavi (1995), this approach aims to develop a creative and critical approach to learning; the use of knowledge where students are encouraged to utilise information from diverse sources; the use of initiative in information gathering and skills in critically evaluating all information and the sources of it. Based on Biley (1999), PBL aims to develop critical thought, analytical ability and synthesis of knowledge and skills by re-evaluating knowledge and understanding throughout the problem-solving process.

2.5.1   The Characteristics of PBL

The main characteristics of PBL as based on Barrows (1997), provide the teacher with a checklist of features to be designed into courses. These characteristics are:

a) student centred – the students are motivated to be responsible for self learning. The teacher will act as a facilitator and will help students to make a right decision. This is in line with Margetson's (1991, p. 45) view of one of the characteristics of PBL. She states that PBL is morally defensible as it pays due respect to both student and teacher as persons with knowledge, understanding, feelings and interests who come together in a shared educational process;

b) problem based - the problem to be used is an ill-structured problem, e.g. a problem in the real world. Enough information will be given to stimulate thinking processes in the students' memory and this will involve inductive and horizontal reasoning, and deductive and vertical reasoning to generate hypothesis. The student works with the problem in a manner that permits his/her ability to reason and apply knowledge to be challenged and evaluated, appropriate to his/her level of learning. Students will face an inquiry learning when the problem is designed (Barrows, 1997, p. 4). In addition, the problem should lead students to discover that there may be a number of solutions (Delisle, 1997, p. 24). In line with the definition of PBL outlined by Savery and Duffy (1995), Boud and Feletti (1991) and Camp (1996) that learning is an active and engaged process - anchor instruction and situated learning support this learning theories. Anchored instruction is a form of a macro-context-based instructional framework for actively engaging students in realistic complex problem solving, reflection, transfer, and CT activities. Anchored instruction is most closely related to the goal-based scenario model. While anchored instruction may also resemble PBL, it is less open-ended. In line with comment above, Margetson (1991, p. 45) also share the same view with her view of another PBL characteristic that it encourages open-minded, reflective, critical and active learning;

c) problem solving – a problem will be used to stimulate effective, efficient development and reasoning skills. PBL works best by using a problem solving framework that includes: interpreting and defining the problem; generating questions that need to be answered about the problem; conducting research to

find answers to the questions; proposing a variety of hypothesis and potential problem solutions that are warranted by the data collected; discussing the pros and cons of these potential solutions; selecting and presenting potential problem solutions to a real audience. The teachers will guide the students at meta-cognitive level. At the early stage, there will be a modelling of the problem solving process and teachers will reduce their role when students start to communicate and make argument with themselves and peers about what they think (p. 4). This feature stated by Barrows is similar to the view of Savery and Duffy (1995), Boud and Feletti (1991) and also Camp (1996) which state that students will act as meta-cognitive while their learning will be focused to solve the thinking skills. In order to solve the problems, the students will need to stimulate their self strategy. The next features of PBL as related by Barrows are;

d) self directed - students can justify what they must learn and this is based on their task to solve the problem (p. 5);

e) reiterative - when students are finished with self-directed learning (such as search of information needed to solve the problem) they will go back to the problems and will apply a new knowledge that they gain through problem solving. The experience that they gain will be used to construct new knowledge. This is similar to the view of Savery and Duffy (1995) that PBL is consistent with the principles of constructivism which emphasize that knowledge is constructed through experience. According to Savery and Duffy (1995), the three primary constructivist principles are that understanding comes from our interactions with our environment, cognitive conflict stimulates learning, and knowledge evolves through social negotiation and evaluation of the viability of individual understandings;

f) collaborative - students will collaborate in the problem solving process and will identify learning issues. The student collaboration will occur during self-directed learning when students form a group to solve the learning issue which has been identified (p. 5). This feature is similar to the view of Savery and

Duffy (1995), Boud and Feletti (1991) and also Camp (1996) who stated that; 'learning will involve the social deals'. The PBL process required group collaborative. The students' thinking, beliefs, perceptions and self knowledge will be challenged when they collaborate with other students and this will stimulate cognitive process development.

Other features of PBL as stated by Barrows are:

a) self reflecting - when the problem is solved, students will make a self-reflection to the new information, compare it with the new problem, make a reflection to face the same problem (for the future), to abstract a concept or a principle, and draw a mind map to show the connection of problem elements and connection of the reason (p. 5). Reflection helps students relate their new knowledge to their prior understanding; mindfully abstract knowledge; and understand how their learning and problem solving strategies might be reapplied.

b) self monitoring - students will monitor, evaluate the progress and self achievement. Self evaluation will be in the form of teacher response, peer group and other evaluation (p. 5). This is similar to another of the PBL characteristics outlined by Margetson (1991, p. 45), she stated that PBL reflects the nature of knowledge which is complex and changes as a result of responses by communities of persons to problems they perceive in their worlds and;

c) authentic - all the required learning behaviour in PBL includes all the required steps by students and it will be evaluated in real world situation. (p. 5)

The features of the learning environment in a PBL curriculum stand out as typical in normative texts about PBL and are regarded as essential for enhancing student learning (Barrows, 1997; Boud & Feletti, 1991; Camp, 1996; Margetson, 1991; Savery & Duffy, 1995). The features of PBL, as an educational practice will be the same regardless of the subject matter or area. A possible conclusion is that since PBL is a flexible way of organizing teaching and learning, there are possibilities for different academic cultures to shape PBL according to their own needs and traditions and to their inherent perspective of learning. As such, the implementation of PBL

does not necessarily mean a new way of thinking about teaching and learning. The academic disciplines are powerful forces in the articulation, maintenance and reproduction of the perspectives, values and beliefs embedded in their cultures. The features identified by Barrows (1997) also can be helpful in making teaching decisions that support the nature of the content and the range of students.

In the PBL curriculum there are five phases which must be implemented by the students:

Phase 1 : Define and Analyze the Problem

Students will form into small groups (contain 5-8 students) and it will be led by facilitator or tutor. After that, all the groups will get a problem scenario (without learning process at early stage). Students must analyze, synthesize, and evaluate to gain a sense of the whole and formulate a viable solution (Torp & Sage, 2002, p. 20). In this process, students will find a real problem, learning issues or learning objectives regarding to three main problem:

a)   What do you know about this problem?

b)   What did you require to solve this problem efficiently? And

c)   What are the sources you require to solve this problem or this generated hypothesis? After that, the students must make an action plan to solve this problem.

Phase 2   Find, Evaluate and Use of Information

The students are allowed to implement self learning. They are required to use CT skills, to evaluate and to use the information according to learning issues and problem or hypothesis that they already know or gain in the first phase.

Phase 3   Presentation and Synthesis

The students will return to their group and will evaluate the problem according to information and knowledge that they gain in the self-learning phase. After developing the best solutions, they will evaluate them in light of the problem statement's central issue and identified condition. Once they select the solution that fits best, they prepare to present their finding and may choose to share the problem and their solution by using concept maps, charts, graphs, proposals, position papers, models and so on. The students will construct knowledge to relate the new knowledge to the current knowledge (if they find new learning issues after the re-evaluation of the problem in phase two and phase one, they can redo).

Phase 4   Abstraction

After all the tasks are complete, the students will discuss the problem, and relate it to the same or a different problem to make a generalisation.

Phase 5   Reflection

Students will reflect on the problem solving process. In discussion, students will implement self evaluation and peer evaluation. This phase will help students to improve their meta cognitive skills.

Another PBL Model as suggested by Torp and Sage (1998, p. 34):

a)   The preparation stage of students

b)   Meet with the problem

c)   Identifying information

d)   Generate a problem statement

e)   To collect and share information

f)   Generating solutions

g)   Determine the appropriate method of solution

h)   Presenting the solution (performance assessment).

i)   Debriefing problems

In this model, Torp and Sage (2002) proposed that through the teaching and learning using PBL approaches, students construct knowledge revolving around a relevant problematic situation in a rigorous, thoughtful, connected way. Torp and Sage (2002) also agree with Savery and Duffy (1995), "PBL exemplifies a constructivist model for education, which serves to best prepare our students for life now and in the future" (p. 45).

In this particular model, Torp and Sage (2002), proposed that the events generate important learning issues around a carefully crafted problem situation so that students can work through the issues in authentic and rigorous ways. Additionally, these events are not necessarily rigid, fixed, or strictly sequenced. At the end of the process, learners may revisit parts of the PBL sequence, particularly defining the problem statement and gathering and sharing of information, as they delve deeper into the problem.

According to Savery and Duffy (1995), these phases can be applied in a different ways and over various time-spans. This is supported by Boud and Felletti (1997):

> PBL is an approach to structuring the curriculum which involves confronting students with problems from practice which provide a stimulus for learning. However, there are many possible forms that a curriculum and process for teaching and learning might be compatible with this definition (p. 15).

Additionally, PBL also engages students in the learning process through using real problem and it also encourage students to involve in deep learning, to avoid memorization of facts, and instead becomes focused on a deeper understanding of the

situation under study (Ramsden 1992). Additionally, the way of presenting problem to students also plays an important role in learning process.

Overall, the PBL models presented by Barrow (1997), Engel (in Boud & Feletti, 1991), Torp and Sage (1998; 2002), and Savery and Duffy (1995) are very important as the major unique characteristics in determining the authenticity of this learning approach. Subsequently, these models are directly used by the researcher in applying the study on the Business Education students in a Malaysian university. This is consistent with the effectiveness of PBL in promoting the students capabilities and achievements in line with the Malaysian government's aspiration to create well-rounded university graduates through the introduction and emphasis on the soft skills.

2.5.2   The Benefits, Importance and Effectiveness of PBL

According to Savin-Baden (2000), therefore students' conceptions of learning and their conceptions of themselves as students and learners are key factors in any attempt to implement PBL successfully and effectively. She also claimed that this approach would improve students' conceptions of learning to a greater extent than a conventional curriculum, thereby increasing their potential to be lifelong learners. In line with this, as stated by Smith (2005), PBL has much to offer Business Education. This approach is a means of using realistic practical problems to drive students' learning of disciplinary content. Learning in this way has many direct and indirect benefits, summarized in Table 1 below.

Table 1:
The Benefits, Importance and Effectiveness of PBL

Potential Benefits of PBL	Relevance Research	Benefit, Importance/Effectiveness of PBL in	
		Medical Education	Management Education
Develop problem-solving skills	Patel, Groen, & Norman (1991); Berkson (1993)	Important, but little evidence of PBL effectiveness.	Highly important, uncertain effectiveness
Improves knowledge retention and recall	Norman & Schmidt (1992)	Highly important, with mixed evidence of PBL effectiveness	Important and PBL may be effective.
Increases of understanding of material	Bridges & Hallinger (1997), Woodward, (1997)	Important, with some evidence of PBL effectiveness.	Important and PBL may offer advantages.
Improve focus on practice-relevant knowledge	Boud & Feletti (1997b)	Important and good reasons for believing PBL is effective.	Highly important; PBL effectiveness depends on the use of real problems.
Improves knowledge integration	Boshuizen, Schmidt,& Wassamer (1990)	Important, with evidence of PBL effectiveness.	Highly important and PBL is likely to be effective.
Promotes thoughtfulness	Schmidt, Dauphenee & Patel (1987)	Important and PBL is promising, though there is little evidence of its effectiveness	Important and PBL may be effective.

Develop teamwork, leadership, and social skills	Bridges & Hallinger, 1997; Woodward, 1997	Important and PBL is likely to be effective.	Highly important and PBL is likely to be effective.
Develops lifelong learning skills	Blumberg, 2000; Woodward, 1997	Highly important with much evidence of PBL effectiveness.	Not as important unless PBL develops experiential learning skills.
Motivates student learning	Norman & Schmidt, 1992; Woodward, 1997	Important, with considerable evidence of PBL effectiveness	Highly important, but PBL may not be effective with some students.

Source and adopted from Gerald F. Smith (2005, p. 361)

The following are of special importance for Business Education:

a) PBL puts the educational focus on practice relevant knowledge, drawing attention from material that is purely of academic interest.

b) PBL assignments can draw on knowledge from multiple disciplines, increasing students' abilities to integrate knowledge across business functional areas.

c) By working in problem solving teams, students using this approach are able to develop teamwork, leadership, and interpersonal skills.

d) This learning approach also increases student motivation, a "supercharging" effect that boosts these and other benefits.

With PBL, there will be higher understanding and efficient growing skills for the students. In other words, this learning approach is more meaningful, useful and relevant to learning sources in lecture or tutorial rooms. When a problem is given, it will get full attention from the students; additionally, difficult but useful, higher understanding and growing skills occur. The transfer of knowledge and skills are easy to occur because students have a chance to train and use the knowledge and skills in the real situation. It is important because social interaction is a main aspect in the real world and working environment. This learning approach will use group work in a problem solving process.

According to Smith (2005), most of PBL implementations and research are to be found in medical education and he summarized and reflected the benefits, importance and effectiveness of PBL as shown in Table 1 above. In this regard, we claim that the implementation of PBL can be achieved in the field of Business Education within providing and solving the problems arising in a positive way. However, the value or the quality of performance in the area of Business Education might not be significant as the achievement attained in the field of Medical Education. This would probably happen as the area of Business Education does not involve the recall of scientific information as required in the practical experience of the Medical field.

The following below is a summary of some benefits, importance and the effectiveness of PBL to the field of Business Education:

a)   Through PBL, it allows us to focus on the education-related knowledge to attract and drawing the attention of the practice materials on academic interest only.

b)   Tasks assigned to the students in PBL groups would enable students to use their skills and knowledge from the various disciplines, and it also would enhance students' ability to apply and integrate knowledge throughout the functional area of Business Education.

c)   Through this approach, it requires students to work in teams to solve the problems presented by the facilitators or lecturers, they are able to generate and develop teamwork, interpersonal skills and also leadership skills.

d)   Through this approach, it may be possible to increase the student tendency or motivation besides to become and acts as the catalyst to enhance for other benefits.

2.5.3   Review of Research into PBL

Many studies in all aspects of PBL have been done in higher education institutions in several parts of the world.   In Malaysia there is also research about the implementation of PBL methodology, but it is very limited.   A discussion on this will be made by the researcher in in a later section.

2.5.3.1   The Efficacy of PBL in Tertiary Education and Teaching Approach

The analyses below included attempts to show the potential of PBL for implementation and impact on CT skills in teaching Business Education.   There has been controversy in recent years over the efficacy of PBL as a teaching and learning methodology (Albanese, 2000; Colliver, 2000; Dolmans, 2003; Farrow & Norman, 2003; Newman, 2003; Newman et al, 2004). Based on Hmelo-Siver (2009), the goals of PBL include helping students to develop flexible knowledge; effective problem-solving skills; self-directed learning (SDL) skills; effective collaborative skills and;

intrinsic motivation. PBL is a process that promotes active learning using CT (Marketa, 2008). Among educational strategies, PBL is thought to promote CT (Dehkordi & Heydarnejad, 2008). This shows that PBL is an effective teaching and learning method and has a positive impact on students. There are many studies which support these benefits of PBL but there has been little research on PBL approaches in the teaching of Business Education. Similarly, the advantages of this approach are well documented especially in the medical, engineering and sciences education. Most of the claims made for the achievements of PBL seem to be based on anecdotal evidence or small scale evaluative studies which may not be widely generalised.

Through this PBL methodology, students became more motivated (Chan, 2000) and their research became more focused and meaningful. This is supported by Chin and Chia (2000) and Syed Anwar (2002) that PBL methods which involved an identified problem by students were efficient. Students became highly motivated because they treated the problem as their own. The students also became more involved in learning and become more creative and critical (Neo & Neo, 2001; Morales-Mann & Kaitell, 2001; Frenay et al, 2007). As for De Graaff and Kolmos (2003), they believed that PBL also helped to increase the consideration of interdisciplinary knowledge and skills. Additionally, PBL has potential to increase the cognitive competitiveness of individuals by eliminating barriers that may inhibit work processes (Yeo, 2007) and encourages students to apply relevant and meaningful information to real life situations (Tiwari, 2009).

CT and its correlation with PBL were investigated by Tiwari et al. (2006). The authors compared relative effect of PBL and traditional lecture on stimulating CT in undergraduate nursing students. Using a randomized controlled trial, and the California Critical Thinking Disposition Inventory (CCTDI), the study was conducted over a three-year period. Employing a pre-test and post-test design, the students were assigned to either PBL or lecture as a learning method. The data were analyzed using multivariate regression and 1 sample and 2 sample t tests. This method was chosen to determine the factors that may have affected the scores on the CCTDI. The researchers also used qualitative data from interviews, coded the data into categories, and compared and contrasted this additional information. Tiwari et al (2006) found a

positive correlation with PBL and an improvement in students' scores on the CCTDI after three years. Further research was suggested, to include studies of motivational differences among students who experienced PBL versus lectures. Sulaiman (2011) also found that PBL is capable of having a positive impact on students' CT for certain criteria. Her study employed a quasi-experimental design based on mixed between-within-subjects repeated measure to investigate whether student performance in creative and CT through PBL online in Physics at tertiary level in Malaysia. In this study, Sulaiman used the Torrance Test of Creative Thinking (TTCT) and the Watson Glaser Critical Thinking Appraisal (WGCTA) to measure the 102 students' thinking skills.

2.5.3.2 Skills, Personal and Propositional Knowledge

Morales-Mann and Kaitell, (2001) and Du (2006) found that PBL has also been useful in developing management, collaboration and communication skills. Savin Baden (2000) and Du (2006) conclude that PBL has also helped in improving the meaningfulness of learning. According to Frenay et al (2007), students in PBL curriculum may be better able to learn and recall information and improving engagement.

Summarising and reflecting on the work by Ward and Lee (2002), in "A Review of PBL" who claimed that the PBL process expands students' CT and problem-solving skills while enhancing their creative capabilities; inter disciplinary teaching is appropriate for vocational subjects, including family and consumer science, and traditional academic subjects like language, sciences, humanities, history, economics, geography and mathematics. The use of PBL by teachers will enable students to get the opportunity to acquire critical skills for the workforce of the future. The rationale for PBL derives from findings of the cognitive sciences regarding how we learn. This is based on the simple premise that problems should precede answers. In PBL, the learning process begins by presenting the learner with an engaging problem, question, or puzzle. Learners discover course concepts for themselves as they explore the problem. However, participating in and exploring the learning event often provides the impetus to engage content and develop skills, just as experts do in practice (Ward & Lee, 2002).

Based on a study by Yuan et al (2008b) to verify promoting CT skills through PBL among Chinese baccalaureate nursing students, it was found that the approach facilitated the students in sharing their opinions with others, analyzing situations in different ways and thinking of more possibilities for solving problems. This learning approach can be a student-driven process that promotes active learning by placing emphasis on research, planning, higher level thinking, CT, and problem solving (Barrows, 1990; Charlin & Mann, 1998). By using a sample of real-world problems to provide students with an alternative form of educational material delivery, this approach improves students' clinical reasoning and professional preparation (Davis & Harden, 1999; McGee, 2003). It increases the active learning process, allowing students to engage in a realistic problem with enthusiasm, initiative, and motivation, thus promoting CT (Heinrichs, 2002). According to Zadrak Ndii, (2010) all this evidence shows that PBL is an effective method to encourage students to develop management, collaboration and communication skills, and think critically

2.5.3.3 Self-Directed Learning (SDL) and Teamwork

Other intended learning outcomes for PBL over and above knowledge acquisition; these would include a capacity for team-working ability (Neo & Neo, 2001) and autonomous learning (Morales-Mann & Kaitell, 2001). Hmelo-Silver and Lin (2000) used information processing and constructivist theories to examine a component process model of the SDL process and they argued that the students, when faced with a novel problem, must use meta cognitive strategies to identify what they do not know and what they need to learn more about to solve the problem. Students also need to figure out what resources they need to remedy their knowledge deficits. Lastly, the new knowledge must be evaluated to determine whether it is the appropriate knowledge and to integrate it with prior knowledge to solve the problem. Hmelo-Silver and Lin (2000) used methods of protocol analysis from cognitive psychology to compare PBL and students' SDL processes on a novel problem solving task. Hmelo-Silver and Lin (2000) also examined several of the individual component processes in SDL, as well as how well students use new knowledge in problem-solving. The findings showed that PBL students are more likely to identify hypothesis related learning issues, to develop a well-specified starting point for their SDL in the plan they generate and to integrate new information into their problem solving.

Additionally, Du (2006) shared the opinion that PBL helped in improving SDL capability. Du examined the learning experiences of engineering students of both genders in a problem based and project organized learning environment at a Danish university. This qualitative study related an amalgam of theories on learning and gender to the context of engineering education. More importantly, SDL is a core concept in PBL (Silen, 2009). According to Burch (2001), PBL methods promote political, social and cognitive abilities. Students benefit from personal experiences that illustrate collaboration over competition, participation over indifference, listening and deliberation over knee-jerk reaction, and democracy over disillusionment or despotism. Developing these political and ethical sensibilities is as important as fostering cognitive skills. PBL appears to be one of the most coherent pedagogical approaches on offer in higher education; offer opportunities for both large scale rigorous evaluative studies and smaller in-depth qualitative studies to unpack the important components of the approach.

2.5.3.4 Student Satisfaction and Achievement

Tan and Ng (2006) stated that PBL premises on its emphasis of active learning through solving 'real-world' problems as well as its multi solution approach is likely to have an advantage if positioned as a pedagogical strategy for entrepreneurship education. Yuan et al. (2008) provided an explanation that PBL approach, in the context of nursing education actually increased students CT skill more than the lecture approach. They also examined the effect of PBL on nursing students' CT skills. They concluded that PBL students' CT skills did not appear to show significant great development in relation to the deduction, inference and evaluation subscale scores. This argument does not stand up, for many students, the types of active learning like PBL requires is and an unusual experience. One method for assisting students in their learning understanding of the PBL process is to ask them to reflect on the experience of PBL at key points in the process (Major & Palmer, 2001). This method allows students to analyze and find the solution to a problem rather than simply applying methods that already known. Learning begins with a problem to be solved, and the problem is posed is such way that students need to gain new knowledge before they can solve the problem.

PBL helped to promote deep approaches of learning instead of surface approach (Dochy et al., 2003; Biggs, 2003). According to Kivela and Kivela (2005) and Du (2006) after exposure to PBL methods, students demonstrated that they were able to take a more pro-active role in their learning, they more readily develop self-management skills in term of their own learning (Maddocks, 2004) and more self-directed in their learning activities. Similarly the students talked about learning in PBL as being both fun and hard at the same time (Salleh et al, 2007; Barret, 2009). For example, group activities rated the highest out of the classroom activities that the students participated in. Qualitative feedback from the students also showed that they valued communicative and interactive learning activities more than the traditional lecture-led method of learning (Kivela & Kivela, 2005).

Additionally, Savin-Baden (2003) believed that PBL helped to develop criticality of learners and the students may be better able to integrate basic science knowledge into the solutions. A recent development in tertiary education involves the application of PBL as a curricular vehicle to develop student talent. According to Brownell and Jameson (2004), PBL has been used for a decade in one graduate management program. PBL capitalizes on synergies among cognitive, affective and behavioural learning. Although Management Education usually privileges cognitive learning, affective learning is equally important. Perhaps it is true that by focusing on real-world problems, PBL helps students appreciate multiple perspectives, recognize non-rational elements of decision making, and confront ethical quandaries. This does indicate that PBL is an effective method to encourage students to analyze and think critically. And it is hoped that by thinking critically, the students would not simply imitate existing Business Education methods, but would create and pioneer new approaches.

From this PBL literature review discussion, the types of problems and how these problems should be solved can influence students' thinking and how they gain knowledge. Specifically, problem and problem solving process are the main characteristics in PBL. Therefore, it can be used to explain both issues. Boud and Feletti (1994, p. 17) stated that the advantage of PBL is to help Business Education students to develop the ability for SDL in order to cope with the ever changing and increasing body of knowledge they will need to succeed as professionals

2.5.4   PBL Difficulties

Successful implementation of PBL does not come easily. All our strengths and skills as teachers will be required. Complex difficulties may arise and according to Todd (1991, p. 132) the difficulties are:

a)   Teachers' role change – teachers constantly face challenges of encouraging students to go beyond the given information, to reflect on learning, and to actively consider how their knowledge might apply in novel contexts. Teachers may also face difficulty as they prepare to facilitate discussion, provide coaching, challenge student thinking and manage group work. The teachers' inability to understand thoroughly the extent of the role or any change they are going to have to make, and to see how this might affect the satisfaction they find in teaching and their feelings of being 'valued' as teachers;

b)   Students' role conflict - students have been assisted to see the relevance (students are encouraged to constantly discover and try new ways of learning) and the benefits of PBL and the reality can sometimes be too much in conflict with their habits and expectations of learning. This is especially true of school leavers who, unless they are introduced carefully and gradually to the process and given the opportunity to acquire successful learning skills early in the course, can actively resist the new approach;

c)   Colleagues' reactions - this is especially important for individuals or small groups who decide to use the PBL technique when the rest of the faculty retains traditional lecturing methods with the same students. Reactions experienced can be: lack of support, total disinterest, or patronizing behaviour. PBL may be seen as self-indulgent and time-wasting;

d)   Keeping the team together - this can be difficult but is vital for any group implementing PBL. Serious differences can easily emerge in interpretation of the philosophy as well as the practical realities. Teachers need to be aware of these possibilities and develop strategies for supporting each other and uniting the group and;

e)   Developing process skills - the teaching of process skills, especially thinking and problem-solving skills is difficult for many teachers who may not have developed these skills fully themselves. If they feel inadequate they may not put enough emphasis on the students developing and practising these important processes.   Without the direction, the support and the confidence which problem-solving strategies and process skills give the students, they can often fail.

Added to this, one of the most difficult aspects of beginning PBL based on Holliester's (1997, p. 3) view is deciding just how to go into the problem. It is true that, as a teacher we seem to be content with the superficial levels of PBL. Sometimes, teachers think that PBL is really about being creative and brainstorming problems and their possible solution. Another way to looking at this is that the creative and original solution isn't necessarily the best. However, there are a lot of CT skills on the part of both teacher and student which are necessary to strip away the layers of a problem so it doesn't just stay a superficial level of creative brainstorming.

2.5.5   Criticism of PBL

Although the PBL approach is fashionable and gaining popularity, not all researchers are convinced of its effectiveness and usefulness. Norman and Schmidt (1992) in their review of the evidence of PBL, conclude that there is no evidence which shows that PBL curricula result in any improvement in general, of content-free problem solving skills. PBL, in contrast to the traditional lecture-based approach is thought to incorporate basic educational principles and to involve theoretical learning mechanisms, which presumably should have a positive and sizable effect on the acquisition of basic knowledge and clinical skills. They also claim that learning through PBL may initially reduce levels of learning but may foster, over periods up to several years. This is supported by Colliver (2000):

> "...revealed no convincing evidence that PBL improves
> knowledge base and clinical performance, at least not of the

magnitude that would be expected given the extensive resources

required for the operation of a PBL curriculum" (p. 259).

Furthermore, the deeper valuation theories and the research have raised questions on the basis of these two. Subsequently, Colliver (2000) suggests that the relationship between educational theories and the research (including fundamental and applied) can be described as weak but it can be considered at the level of the best strategic position. For Colliver, a crucial measure was that of effect size (in this case the effect size is the difference between the mean performance of students taking PBL and that of those following non-PBL courses divided by the standard deviation of the entire population of students). Colliver argues that a size effect less than 0.2 are negligible; one between 0.2 and 0.49 is small; one between 0.5 and 0.79 is moderate; and a large size effect is 0.8 or greater.

One major criticism toward PBL is that most of the students, who are new to PBL approach, have an experience of frustration and concern about differences in learning process across their tutorial groups. According to Sararinen-Rahiika and Binkley (1998), students have a difficulty to determine the appropriate depth and breadth of their preparation, and are anxious about whether they have mastered the content enough to pass the exams. This was due to their belief that the instructors in PBL process have a full responsibility to tell them everything what they need to know and what they need to learn. Students are initially uneasy in trusting their group members to contribute effectively to their learning experience. Additionally, students may be reluctant to provide constructive criticism to their group members, and to honestly share their own critical self-evaluation with facilitators and members (Lusardi et. al., 2002). Lusardi, Levangie and Fein (2002) also insist that students who are concurrently enrolled in a PBL course and several traditionally delivered courses express frustration with significant difference in expectations for their participation and study strategies across courses.

Another criticism raised was that the students may not really know what would be important and useful for them to learn, especially in areas which they have no prior experience. According to Hays and Simon (1974), the journey from problem to solution can be a difficult and tricky, and they described this as the solution path

length. Jonassen and Hung (2008) raised the obstacle and issues that have to be conquered when attempting to arrive at a credible solution in problems in PBL approach include searching the issues existing in the problem, to seek proposed alternative solutions and subsequently choosing reliable resolution. However, they highlight that the difficulty of the solution only gain a minimal concern in most of the research related to PBL. This might be because at the early stages of PBL implementation, students have a problem to understand and this places pressure on students in terms of their workload and use of time. They also suggested and argued that the most important two factors in problem solving difficulties are the complexity and consistency. However, according to Jacobs, Dolmans, Wolfhagen and Scherpbier (2003), students put the consistency of the problem at a more critical level compared to complexity with the hope that they can solve the convenient problems first. Based on this evidence, Smith and Cook (2012) suggested that implementing some form of scaffolding in the problem-solving process, which supports the learner in his or her understanding of how the problem is structured, would consequently reduce the complexity of the problem.

Therefore lecturers or teachers, as facilitators, must be careful to assess and account for the prior knowledge that students bring to the classroom. Lecturers or teachers who are involved in the implementation of PBL approach, would probably be unable to provide much needed course material compared to when they are engaged in a conventional lecture. PBL approach can be extremely challenging to implement because it requires the diversity of planning and hard work by lecturers and teachers involved. In the early stages of PBL approach implementation, it may be difficult for lecturers and teachers because it is possible to let go off the control and otherwise became a facilitator. Lecturers and teachers should encourage and motivate the students to inquire the right questions and not merely hand over to the students to obtain the right solution.

For the lecturers or teachers who conduct a PBL approach, this would involve the use of maximum time compared to the traditional approach. Rather than solely to provide the material for teaching and learning throughout the semester, they also engage in the preparation of holistic planning courses covering course objectives, including materials and case studies which will determine whether the objectives that have been

planned in the early stages are met or not during the implementation of PBL modules. A lecturer who is involved in PBL orientation also need to adjust the meetings and discussions with the tutor or facilitator regularly to ensure that all plans and objectives are related to PBL. Accordingly, one criticism of the effectiveness of PBL is the need for more tutors or facilitators to handle the implementation of a course or program. According to Lusardi, Levangie and Fein (2002), the use of time within PBL is not efficient or effective if the time taken is 3 hours or more for the operation of a small group containing 4 or 5 students, compared with the period that can be used to handle the concept of TL (mass-lecture) for the entire students of a course or program. This inefficiency may be offset by the advantages and effectiveness of the PBL process of direct interaction between the lecturers and students, and their enthusiasm in the discovery of learning through a PBL approach.

Despite these challenges, the empirical reviews of the dissemination of PBL have been so positive based on evidence which has increased in the past two decades. Over a similar time frame, this approach has been widely adopted by undergraduate medical schools (Sanson-Fisher & Lynagh, 2005). They also claimed that PBL provides a more satisfying learning experience than Traditional methods.

2.5.6   Summary of PBL Literature

In summary, the literature essentially proposed that students had a positive impression on the implementation of PBL. The implementation of this learning approach is also useful for the developmental of learning and students' learning skills. Educational practitioners and pioneering for curriculum development stress the importance of providing the student with a good design of issues and a dynamic build of PBL curriculum. Effective implementation of this approach plays an important role for understanding the problem solutions and, the facilitator as well as student.

Student experience is a priority in the preparation and to ensure the effectiveness in designing the problems and suitable for PBL curriculum. Structuring of knowledge in PBL in view of the Schmint (1993) are based on following approach: a brief analysis of existing problems and solutions through discussion activities of small groups; expression and critique of existing ideas or information and the search for new ideas

or information actively; restructuring existing knowledge; building of semantic networks and relationships, and building social knowledge; learning in context, and findings or presentation simulation based on the ideas or information search and consistent with existing problems.

Based on the views and previous studies, PBL would be an efficient and reliable manner when it is successful to create the confidence of students to learn in isolation, and a connecting and path to students to experience closer to the reality in real life. In addition, to ensuring the success of PBL, the lecturer or facilitator engaged in the conducting PBL should be also have the skills and competency includes the ability to identify, articulate and to access various skills such as questioning skills, skills to manage and control the dynamics of group, strengths and passion for success, facilitating meta cognitive aspects (such as teaching students how to become more aware of their learning processes and products as well as how to regulate those processes for more effective learning, and it requires the ability to use higher order thinking skills such as analysis, synthesis, evaluation and creation of new knowledge).

2.6   A Brief History and Review of CT Skill

Based on the Greek Socratic tradition, CT probing questions were used to determine whether claims to knowledge based on authority could be rationally justified with clarity and logical consistency.   This skill frame traces its roots in pragmatist constructivism and analytic philosophical over 2,500 years ago.   According to Paul and Elder (2007a) the word critical (known as kriterion in Greek), describe crucial or related to core criteria, which means standards and a second word derives from kriticos, which means discerning judgment.

Paul and Elder (2007b) through their article, "A Brief History of the Idea of Critical Thinking" explained how the philosophical traditions of Socrates, Plato, and Aristotle gave rise to the CT processes we teach today:

> From this ancient Greek tradition emerged the need for anyone who aspired to understand the deeper realities, to think systematically, to trace implications broadly and deeply, for only thinking that is comprehensive, well-reasoned, and responsive to objections can take us beyond the surface.

As stated by John Dewey, we have increased our sense of the pragmatic basis of instrumental nature (its human thought), and especially its grounding in real human goals, objectives and purposes.

CT has often been thought as a prevalent topic of discussion within the educational realm nowadays. The concept has received a lot of attention because of its   widely recognised role   in the school reality. At the same time, there is an urgent need to clarify various issues involved in CT, as the concept's painstaking character leaves space for various kinds of understanding and interpretation.

It has been widely accepted that CT is an important and vital topic in modern education and all educators are interested in teaching CT to their students (Schafersman 1991). In actual fact, the purposes of specifically teaching CT in the

Business Education or any other education disciplines is to improve the thinking skills of students and also to prepare them in the challenging world.

This is true if we use the view by Norman (1980) that it is strange that we expect students to learn, yet we seldom teach them anything about learning. According to Lochhead and Clement (1980), we should be teaching students how to think. Instead we are teaching them what to think.

Specifically, in an attempt to organise the topics covered by the CT literature, this literature review will come up with two general categories pertaining to CT: its nature, and instruction. Those include other sub themes, which are presented later. The present section is an attempt to draw the extant picture of CT from an educational perspective. That means that the presupposition underlying the presentation which follows is that CT plays an essential role in schooling, and is an object of learning; research should focus on the discovery of the most effective instructional method for its development and promotion.

CT is significant to the actualisation of the above. It prepares the student with the necessary tools for responding to the changes and new challenges arising. It facilitates the execution of the individual tasks involved in such a process, by providing, for example, the method to handle large volumes of information, to evaluate judgements; it enables the students to make their own conclusions. Facione (2011) describes CT as sceptical without being cynical. According to him, CT is open-minded without being wishy-washy and analytical without being nitpicky. Furthermore, CT can be decisive without being stubborn, evaluative without being judgemental and forceful without being opinionated. Moreover, CT promotes flexibility in the sense of adjustment to the current circumstances by involving mechanisms of generating knowledge and supporting the adoption of multiple perspectives. Concerning also the personal sphere, CT promotes self-insight and awareness of societal frames, thus contributing to the harmonious development of the self. According to Zhang (2007), theorists and educators have offered various definitions to describe the nature of CT.

The definitions of CT as reasonable and reflective thinking focused on deciding what to believe or do (Ennis, 1987), better thinking (Perkins, 1987); distinguish between thinking that is directed at adopting versus clarifying a goal (Nickerson, 1987).

The American philosopher, psychologist and educator, John Dewey is widely regarded as the 'father' of the modern CT tradition. Dewey called CT as a 'reflective thinking' and defined it as:

> Active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further conclusions to which it tends (Dewey, 1910, p. 9).

Additionally, Dewey (1910) also describes that thinking, however, reveals tendencies which need constant regulation:

> "…natural intelligence is no barrier to the propagation of error, nor large but untrained experience to the accumulation of fixed false beliefs" (p. 21).

Dewey's definition suggests that CT has both an intellectual and an emotional component.

By defining CT as an 'active' process, Dewey is contrasting it with the kind of thinking in which you just receive ideas and information from someone else - what you might reasonably call a 'passive' process. For Dewey, and for everyone who has worked in this tradition subsequently, CT is essentially an 'active' process - one in which you think things through for yourself, raise questions yourself, find relevant information yourself, etc. rather than learning in a largely passive way from someone else. In defining CT as 'persistent' and 'careful' Dewey is contrasting it with the kind of unreflective thinking we all engage in sometimes, for example when we 'jump' to a conclusion or make a 'snap' decision without thinking about it. Sometimes, of course, we have to do this because we need to decide quickly or the issue is not important

enough to warrant careful thought, but often we do it when we ought to stop and think - when we ought to 'persist' a bit.

Based on the explanation by Dewey, we can conclude that students must be taught to examine, poke, question, and reflect on what they have learned. Scepticism, questioning, and reflection are essential. Examine a problem, find a solution, think about why you were or were not successful, and learn from your successes and failures. In summary, CT involves students in doing things (probing, questioning, etc.) and thinking about the things they are doing (reflecting, evaluating teacher feedback, etc.).

Watson and Glaser (1980) define the concept of CT as the unity of attitude, knowledge and ability which comprise:

a)   curiosity and ability to identify the existence of problems and accepting the evidence which support what is considered as true,

b)   knowledge of conditions to construct a valid conclusion,

c)   generating ideas and generalisations which are supported by logical evidence and

d)   the ability to apply the attitude and knowledge above.

This means that the new information will be first analysed and assessed with various CT skills and supported with logical reasoning before it is accepted and used. From this concept, Watson-Glaser Critical Thinking Appraisal (WGCTA) was developed and it listed five subsets of inference, recognition of assumption, deduction, interpretation, and evaluation of arguments (Magnussen et al., 2000). The WGCTA (Forms A and B) comprises 80 items which assess the individual's CT ability. The creators (Watson and Glaser) of the instrument viewed CT as a composite of attitudes, knowledge and skills.

This definition is useful as it draws attention to a feature of CT on which teachers and researchers in the fields seem to agree on, that the only realistic way to develop one's CT ability is meta-cognition, and consciously aiming to improve it by reference to some model of good thinking in that domain (Fisher 2001). Although there are different definitions, it is agreed that CT involves dispositions, creative thinking, problem solving, decision making, and meta-cognition (Ennis, 1987; McBride, 1991; Tishman & Perkins, 1995).

This definition leads to the conclusion that CT is the practice of processing this information in the most skilful, accurate, and rigorous manner possible, in a way that it will lead to the most reliable, logical, and trustworthy conclusions, by which one can make responsible decisions about one's life, behaviour and actions with full knowledge of assumptions and consequences of those decision.

CT has been considered one of the central goals in all levels of education and it has generated a wealth of literature. Theories and educators in the field agree that the characteristics of CT is defining problems; asking appropriate questions; analyzing assumptions; synthesizing information; evaluating results. According to Molitor and George (1976), CT consists of three abilities:

a) ability to collect data and to use the correct senses to choose related information,

b) ability to analyze the data and to process the data, to classify, to make inferences, to make forecasts, to validate and to design hypothesis, and

c) ability to take action on information and to solve a problem.

In the same way, good or effective critical thinkers as mentioned by Beyer (1987) have the ability to:

a) distinguish between verifiable facts and value claims;

b) distinguish relevant from irrelevant information, claims, and reasons;

c)   determine factual accuracy of a statement;

d)   determine the credibility of a source;

e)   identify ambiguous claims or arguments;

f)   identify unstated assumptions;

g)   detect bias;

h)   identify logical inconsistencies in a line of reasoning;

i)   recognize logical inconsistencies in a line of reasoning; and

j)   determine the strength of an argument or claim.

This statement is true up to a certain point as suggested by Facione (1990):

> "…that CT is understood to be purposeful, self-regulatory judgements which result in interpretation, analysis, evaluation and inference, as well as explanation of the evidential, conceptual, methodological, criteriological or contextual considerations upon which that judgement is based" (p. 2).

In this research, the researcher took into account CT as defined by Facione (1990, 2011).

2.6.1   The Core of CT Skills

CT characteristics or aspects point towards the critical thinker. This led some scholars and writers to explore CT in terms of the characteristics of the thinking which are involved.   Strohm and Baukus (1995) regard dealing with ambiguity as

an important part of CT. They further stated that ambiguity and doubt serve a CT function which is necessary and becomes a productive part of the process (p. 56). From Wade (1995) point of view, he listed eight characteristics of CT; asking questions, defining a problem, examining evidence, analyzing assumptions and biases, avoiding emotion, reasoning, avoiding over simplication and considering others interpretation, and tolerating ambiguity.

As put forward by Beyer (1995), the core characteristics of CT skills can be categorized and conceptualized into several characteristics such as:

a) Dispositions

Beyer describes a person who thinks critically as one who is open-minded, sceptical, respects reasoning and evidence, respects precision and clarity, values fair-mindedness, views something from various points of view and also would change positions when the reasoning leads him to do so.

b) Criteria

When we think critically, we must use criteria as this condition is required for something before we judge it. Although the argument can be made that each area or issue has different requirements and criteria, there must be a measure of quality or standard which is relevant to all subjects. Additionally, according to Beyer (1995), a statement of resolution and evaluation should be based on precise and significant information; unprejudiced; based on convincing sources; precise information; logical reliability; strongly reasoned and also free from logical misleading notions.

c) Argument

When we look into an argument, we must present the logical evidence to support a proposition or statement. This would involve CT skills such as identifying, evaluating and ending with constructing an argument.

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d) Reasoning

The person also must have the ability to infer a conclusion from one or various sources. Additionally, the relationship between and among statements of data require a logical evaluation.

e) Point of view

This refers to the way a person views the world, shaping his construction of significance or meaning. The person who thinks critically is required to view a particular phenomenon from various points of views in order to further understand it.

f) Applying criteria procedures

A general procedure is used for other types of thinking. On the other hand, CT uses extensive procedure such as asking questions, identifying assumptions and making judgment or reasoning.

To think critically, we would use our command of elements of thinking to adjust our thinking to become logical. According to Paul (1990), we develop special features of the mind when we routinely come to think critically such as; developing special features of the mind, intellectual courage, intellectual humility, intellectual integrity, intellectual perseverance and confidence in our judgment or reasoning.

In order to promote students ability to think critically, one must employ primarily these components. The researcher took into account the core CT skills presented by Facione (2006) which are:

a) To create inferences - to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation;

b) To investigate assumptions - all reasoning must begin somewhere i.e some things must be taken for granted. Any "defect" in the assumptions or

presuppositions with which the reasoning begins is a possible source of problems in student reasoning. Assessing skills of reasoning involves assessing their ability to recognize and articulate their assumptions, again according to the relevant standards. The student's assumptions may be stated clearly or unclearly; the assumptions may be justifiable or unjustifiable, crucial or extraneous, consistent or contradictory;

c)   To make deductions (logical or reasoning) – the two methods of reasoning are deductive (facts, certainty, syllogisms, validity, truth of premises sound arguments and conclusions) and inductive (diverse facts, probability, generalizations, hypotheses, analogies inductive strength);

d)   To make interpretations - comprehend and express meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria; and

e)   To make judgements (evaluation) - assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representation.

These were identified by the Delphi method, where a panel of 46 individuals from a variety of academic disciplines participated in a study carried out on behalf of the American Philosophical Association (APA). The final definition CT skills in the report are stated below:

> We understand CT to be purposeful, self regulatory judgement which results in interpretation, analysis, evaluation and inference as well as explanation of the evidential conceptual, methodological, criteriological or contextual considerations upon which that judgement was based. CT is essential as a tool of inquiry. CT is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive,

well-informed, honest in facing personal biases, prudent in making judgements, willing to consider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in selection of criteria, focused in inquiry and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit (Facione, 1990, p.4).

Their consensus statement is reproduced by Facione (2006, p. 21). Facione also developed the California Critical Thinking Skills Test (CCTST) that targets five fundamental CT skills such as analysis, evaluation, inference, deductive reasoning and deductive reasoning. This test instrumentation contains 34 items which range in difficulty and complexity.

2.6.2 CT Skills in Tertiary Education and Teaching Approach in Malaysia

The development of CT has been a fundamental goal in education in Malaysia. The Malaysian government has encouraged the use of these skills in higher education institutions through the introduction of Soft Skills. The government has identified human capital development as the most critical element in achieving its Vision 2020. Human capital development encompasses a holistic acquisition of knowledge, skills and attitude, complemented by soft skills capabilities. Soft or generic skills refer to the cluster of personality traits, social graces, language proficiency, personal habits and team work. Accordingly, the MOHE, Malaysia has explicitly identified seven elements of soft skills (Mohd Majid et al, 2008) that included communications' skills, problem solving and thinking skills, continuous learning skill and information management skills, work in group skills, leadership skills, entrepreneurship skills and professional ethics. According to Malaysian Deputy Prime Minister, Muhyiddin Yasin when opening a meeting of the National Students Consultative Council (NSDC) 2010 on 5 August 2010, students of higher education institutions should be equipped with generic skills such as problem-solving skills or how they can produce something through an explosion of creativity and innovation. Additionally, he also

mentioned and reminded that the professional skill and the search of knowledge should be not limited in the lectures only.

Before the introduction of Soft Skills, Malaysian students already have experience with problem solving and creative and CT teaching through Kurikulum Bersepadu Sekolah Rendah (known in English as Integrated Curriculum for Primary School, KBSR) and Kurikulum Bersepadu Sekolah Menengah (known in English as Integrated Curriculum for Secondary School, KBSM), but it is not detailed. So far the education system in Malaysia is exam oriented. Therefore, teachers have to complete the syllabus every semester. Due to the lack of time, the teacher has to focus on spot questions (examination tips or/and possible questions on main exam) and specific topics. This may enable the students to know how to answer in the exam (by making the maximum preparation how to answer the possible questions in the main exam). Most parents also will want their childrens to do well in examination, so whether teachers like it or not, they have to focus on teaching students how to answer the examination question.

Accordingly, critical and creative thinking became main goals for education in Malaysia. The Ministry of Education in Malaysia via the Education Act (1996) also focused on thinking skills through:

> "...an educational programme that includes curriculum and co-curricular activities which encompasses all the knowledge, skills norms, values, cultural elements and beliefs to help develop a pupil fully with respect to the physical, spiritual, mental and emotional aspects as well as to inculcate and develop desirable moral values and to transmit knowledge".

<div align="right">Education Act 1996</div>
<div align="center">[Education (National Curriculum) Regulation 1997]</div>

Thus, Pelan Induk Pembangunan Pendidikan (known in English as Educational Development Main Plan, 2006-2010) also brings a focus on thinking skills:

Education plays an important role in developing human capital with a strong identity, competence, positive attitude, knowledgeable and high-skilled in order to fulfil the needs of the developed nation in 2020. The human capital to be cultivated should be able to think critically and creatively, to solve problems, having the capacity to create new opportunities, having the resilience and the ability to face the changing global environment.

Accordingly, critical and creative thinking became the main goals for education in Malaysia. The Malaysian educational reform's components; curriculum, training programs, research, university subjects' curricula were to be designed to focus on development of students' CT abilities. The former Prime Minister of Malaysian, Abdullah Ahmad Badawi stressed that the Malaysian government has expressed a desire to foster both creativity and CT in students. Badawi's (speech, January 6, 2007) mention these when responding to the blueprint for education development (2006-2010). According to Abdullah Ahmad Badawi, "we want the development of modal insan (as known in English as model citizen), students who can think critically and creatively, who are able to solve problems and have the ability to adapt themselves to an ever-changing global environment". Therefore, based on this matter, it is important to investigate the relationship between Educational Development Main Plan (implementation and students CT skill. The basic principle, which is the development of students' CT is also included in UPSI's main agenda, as regards to the Business Education curriculum.

2.6.3 The Importance of CT Skills

The aim of the Falsafah Pendidikan Negara (known in English as Malaysia National Education Philosophy) Ministry of Education (1996) is to develop individuals who are intellectually, spiritually, emotionally and physically balanced and harmonic, based on a firm belief in and devotion to God. In this context the lecturers should understand and have a deep awareness in the National Education Philosophy as the implementation of thinking skills are based on the core of this philosophy. The implementation of thinking skills in this study means that the lecturers will implement

the thinking skills integrative in teaching the contents of Business course using a well-planned method.

The ability to think critically is an outcome generally expected of graduates from tertiary education. According to Paul and Elder (2005), CT had become important due to four trends: accelerating change, intensifying complexity, escalating interdependence, and increasing danger. CT is an important issue in higher education and the development of CT skills is one of the primary aims of an undergraduate degree. The Quality Assurance Agency for Higher Education in the United Kingdom states that a psychology student should be able to make crucial judgements and evaluations as part of their generic skills (The Quality Assurance Agency for Higher Education, 2002). One must acknowledge that CT is a necessary skill for the full understanding of theories, evidence and the core issues and debates in the domain of psychology and other disciplines (Guiller et al, 2008). The mere acquisition of knowledge through memory is often not sufficient for effective learning. Learners need to make sense of what they have learned and know when, where and how to use knowledge. Understanding the knowledge acquired is, therefore, fundamental to effective learning in most cases. The key mental process in understanding is thinking. The view of Facione (2006), "people who are poor critical thinkers, who lack the dispositions and skill..., cannot be said to be liberally educated, regardless of the academic degrees they may hold".

CT skills in Business Education in this study was adopted based on the opinion of Facione and Facione (1990) which includes searching the data, interpreting data and analysing problems quickly, identifying viable options and implementing a rational option of business strategies while being able to explain the rationale for that business option using accepted theories. Central to all this is weighing up evidence, strategies and sources. CT is a skill that most teachers or lecturers would readily agree is important for students to develop. Unfortunately, many of our students have poorly developed CT skills – the problem is rooted in those who teach (Rudd, 2007).

2.6.4   CT Teaching Strategies

Many studies in all aspects of CT have been done in higher education institutions in several parts of the world. In Malaysia there is also research about the implementation of CT skills, but it is very limited.

The teaching of thinking skills began in the United States in 1980 with CT skills and it was followed with creative and CT skills in 1985. In 1990, the teaching of creative and CT skills was developed to meta-cognitive reflection about learning (Fogarty & McTighe, 1993). It has been widely accepted that CT cannot be taught by lecturing but Fisher (2005) believed that the thinking skills tradition argues that thinking skills can be taught and should be taught.

According to Rudd (2007), good thinking skills will not develop on their own, they must be taught. Teaching thinking skills is a difficult endeavour because it is an abstract skill rather than a skill based upon clear cut procedures (Brooks & Shepard, 1990). Some studies suggest that CT improves over time (Angel, Duffey, & Belyea, 2000; Pepa, Brown, & Alverson, 1997) and according to Sternberg and Lubart (1995), CT can be beneficial for both the individual student and society.

On the other side, the lecturer should master with CT before becoming associated with PBL. Then he or she would be able to apply and engage students to think critically in any intellectual task including choice among options or judgment. This is line with Beyer (1991) who states that to master a skill, including CT skills it should be learnt in early stages. Within the process to master CT skills, the lecturer should able to explore the five types of intellectual resources that were developed by Case (2005, p. 45-49):

a)   Background knowledge
     Knowledge of relevant information about a topic that is required for thoughtful reflection. Although it should be obvious that we cannot think critically about a topic if we know little or nothing about it, many accounts of CT are based on a presumption that thinking skills or operations are independent of the content areas to which they are to be applied. Properly understood, relevant background

knowledge is not separate from any skill, but part of what is required to be skilled. For this reason, individuals need to acquire information relevant to the range of topics that we want them to be able to think critically about. Presumably this range of topics is (or should be) found in the subject matter of the curriculum. This point speaks strongly for embedding the teaching of CT with the teaching of curricular content;

b)   Criteria for judgment
Knowledge of the appropriate criteria or grounds for judging the reasonableness or merits of the options presented by a thinking challenge;

c)   CT vocabulary
Knowledge of the concepts and distinctions which are needed to think about the challenge;

d)   Thinking strategies
Knowledge of procedures, heuristics, organizing devices, algorithms and models that may be useful when thinking through a challenge;

e)   Habits of mind
Commitments to the range of values and principles of a careful and conscientious thinker.

Accordingly, these proposed five (5) approaches or types as suggested by Case (2005) are extremely important to help the lecturer or teacher to identify what needs to be taught to the students to facilitate them to understand and perform the assigned tasks in a more critical and effective way. On the word, lecturer or teacher can help students understand content. Through this approach, the lecturer or teacher can use strategies which resemble rote (memorizing) tasks such as methods of notes-taking toward methods of cultivating CT skills. This is done by introducing to students the criteria and strategies to take a lecture notes effectively, such as keywords, mapping the ideas, phrases sentences conjunctions and so on. Besides this, it can nurture the intellectual, commitment and work ethic and also to increase and stimulate CT skills in competent manner.

Another study by Goodfellow (2001) support the idea that CT requires prior experience, as prior experience is necessary in order for one to be considerate and reflective. Teaching to promote thinking takes much time to prepare, is difficult to plan, and limits the amount of content 'taught'. To sum up, when students engage in CT, they have an opportunity to examine tacitly held knowledge of one another, make knowledge and think explicitly, respond to questions and comments, and clarify their thinking processes.

Several researchers stated the types of teaching strategies that may be used to promote students' CT skills. Swartz and Parks (1994), cited by Innabi and El Sheikh (2006), suggest that there are two approaches to teach CT using content disciplines:

a)   the embedded approach – where the CT skills are taught in indirect ways without spelling it out to students; and

b)   the infusion approach - where CT skills are taught manifestly using the discipline's content.

Questioning is one of the strategies used to enhanced CT and this has been used in Socratic teaching. It is quite right, according to Paul and Elder (2003), that this type of questioning seeks to clarify information, to identify a point of view, to discover assumptions, to differentiate factual claims from value judgements, and to detect flaws in reasoning by asking students questions and not by giving them answers. More specifically, Banning (2005) agree that by asking metacognitive questions, this may stimulate students to think critically. Flavell (1979) cited by Noushad (2008) viewed meta-cognition as "knowledge and cognition about cognitive phenomena". Meta-cognition is often referred to in the literature as "thinking about one's own thinking", or as "cognitions about cognitions". It is usually related to learners' knowledge, awareness and control of the processes by which they learn and the meta-cognitive learner is thought to be characterized by the ability to recognize, evaluate and, where needed, reconstruct existing ideas. More importantly, when his or her meta-cognitive ability has been sufficiently developed, the student's 'inner disciplined voice' would preclude the need for any 'Socratic questioner'.

According to Juremi (2003) in her PhD study, she reports that higher order thinking skills among students are essential in problem solving, and that CT is an important part of problem solving. Additionally, Juremi also reports that through a PBL approach, students' CT ability became improved by teaching them explicit CT learning process skills. She also comments that the skill involved evaluating all the relevant information and knowledge to solve a particular issue; thus by this phase, the application of CT subset will occur. The next skill is making an inference, and it will be followed by making an assumption, deduction, interpretation and also evaluation of argument.

Based on the suggestion by Weerts (2005), working in groups can reduce students' stress while trying to answer the difficult questions and point out that working together may result in better answers than working alone. In line with this, Weerts suggests that student groups can work together and develop CT skills by:

a)   Identifying issues

b)   Gathering authoritative sources

c)   Identifying potential treatments

d)   Presenting competing points of view

e)   Weighing modalities in light of the presenting case and then agreeing upon the treatment plan

Zohar et al. (1994) suggests that activities that expose students to the use of CT skills such as discussion in class and in small groups, data management, problem-solving, and experimental analysis are capable of increasing their CT skills. Other research by Burris (2005), likewise suggests the most effective way to improve the ability of students to think critically is through appropriate teaching methodologies. In other words, the instructional strategies will affect knowledge acquisition and CT skills. However, it should not be forgotten that PBL is an instructional strategy that favours a more constructivist approach. In the same way, learning occurs when students

construct their own knowledge by solving authentic problem and reflecting on their own experiences.

Following an idea stated by Critchley (2011, p. 12), the rationale for examining CT focuses around a role for universities, and particularly Business schools, to contribute to a healthy polity (both domestically and internationally), providing the space and support for students to reach their potential, contributing to economic development and enhancing the quality of the workforce, all through creating better thinkers. Critchley also stated that for the individual, this is about growing and maturing in thinking with a transformational potential on quality of life, as well as a skill set for employability.

2.7   Review of Research into CT

According to Juremi (2003), the literature suggests that higher order thinking skills among students are essential in problem solving, and that CT is an important part of problem-solving. Juremi also comments that through explicit teaching of CT students are exposed to concepts such as inference, deduction, interpretation, judging and argument, all of which encourage them to think critically. There are many teaching approaches reported to improve CT: problem solving (Zohar, Weinberger, & Tamir, 1994); problem-solving on the Internet using Web-based authoring tools (Neo & Neo, 2000); a collaborative faculty approach (William et al., 2003); immersion learning (Warren, Memory, & Bolinger, 2004); evidence-based practice (Profetto-McGrath, 2005); asynchronous discussions (Walker, 2005); project-based online learning (Kurubacak, 2006); dialogic-learning (Frijters, Dam, & Rijlaarsdam, 2008).

For example, in Malaysia, Sulaiman (2011) reported that through online PBL, students became involved in a holistic form of the teaching and learning process (e.g., content learning; skill of learning; also learning with minds-on and hands-on), which is quite different to their traditional experiences. Other research in Malaysia is by Juremi (2003) reports that a PBL approach improved students' CT by teaching them explicit CT learning process skill (i.e., evaluate all the relevant information and knowledge to solve a particular issue; thus by this phase the application of a CT subset will occur, making an inference, making an assumption, deduction, interpretation and also evaluation of argument). Other research by Zohar et al. (1994) likewise suggests that activities that expose students to use of CT skills such as discussion in class and in a small group, experimental analysis, data management and problem-solving, are capable of increasing their CT skills.

Based on the statements and evidence outlined above, PBL is consistent with these findings and conclusions which are associated with the acquisition and mastery skills including the CT skills that had been suggested by Beyer (1991) such as:

a)   The thinking skills including CT skills as the outcome of learning that has not been acquired learning automatically from the learning of particular subjects or courses. To become critical thinkers, students should identify and justify the

reasons to support and defend their opinion and assumption. When errors are pointed out in any inquiry, a student or a critical thinker is able to correct these errors with their own procedure or methods.

This is in line with the findings of Lipman (1988), where CT is particularly sensitive to the characteristics of the holistic and specific situations in context. Lipman stressed that:

> "...students who are not being taught to use criteria in a
> way that is sensitive to context and self-correcting are
> not being taught to think critically" (p. 43).

b)   The thinking skills including CT skills have not been acquired from a single subject or a few teaching process.

c)   The transfer of thinking skills including CT skills rarely occur itself outside the context of original learning.

d)   To master a skill including CT skills, it should be over learned at the early stage.

e)   At the early stage of learning skills including CT skills, the focus should be given explicitly on learning skills. Any interference from the subjects or other skills should also be mitigated or avoided.

f)   The early stages of teaching skills including CT skills should be followed by frequently guided practice.

g)   To facilitate the transfer, any skills including CT skills should be applied differently from the context of networks and teaching situations.

h)   Generalization of skills may be generated through the implementing of several tasks that require various CT skills operations.

i)   Students are motivated to learn a skill when they are portrayed that the skills are necessary to achieve any objective within the subject studied.

2.8   Summary of Literature Review

The literature review assumes that PBL methods stimulate teaching and learning.   The problem is the main focus of teaching and learning that will happen through problem solving activities. Declarative knowledge and skills which are gained through CT skills will be applied to solve a problem. This process is repeated, so the knowledge and skills will be easy to memorize and it will be kept in long term memory. It will be easy to recall when it is needed and it is an automatic process.

There is a lot of literature on the development of PBL pedagogical approach in tertiary education. This educational approach is known to have maximum positive impacts in producing professional competencies among graduates in many educational disciplines. However, there is limited discussion about PBL pedagogical approaches implemented in Business Education. This approach has not been established as a major pedagogical method in schools of business around the world. In spite of this, there are a few schools of business that use the implementation of this learning approach in their curriculum structures.

Generally, PBL is found to have positive values which are effective in teaching and learning process, and become an alternative to the traditional methods of teaching and learning. The findings of previous studies have shown that through PBL, students are able to maintain information and ideas in the classroom for a longer time and without prejudice issues of syllabus content or subject. In addition, these studies also reveal that performance on achievement tests is either similar, if not better than the achievement where non-PBL approaches where used. It proves that PBL is geared towards becoming one of the best alternatives to the traditional pedagogy. PBL has high potential for improvement of the learning process, and it may help the shift from rote-learning to learning with thinking; from passive learning to active learning; from surface learning to deep learning; and from forced learning to meaningful learning. The attitude and interests of students towards learning are also good and the motivation accompanied by the will to learn is enhanced by PBL. Academicians, although they may feel worried to give the freedom to students during the early stages of PBL, are finally convinced of the effectiveness of the PBL approach. Through the PBL, students can increase the thinking skills, problem-solving skills and increase

their academic performance. According to Hmelo-Silver (2004), the concept of "learning by doing" in the PBL approach in actual fact based on Experiential Learning Theory. This theory encouraged students to learn thinking strategies through solving the problems. In addition, the lecturer or facilitator then stimulates students' CT in looking for the best solution. This idea was in line with the concepts of "scaffolding" from the view of Constructivist Learning Theory (Hmelo-Silver, 2004; Wee, 2004).

From the literature review a number of initial research questions and hypotheses emerged. The research questions and hypotheses will be tested in detail in the next section (Chapter 4) in the context of the implementation of a PBL on Business Education students at UPSI, Malaysia. These are outlined in Table 2 below:

Table 2
Research Questions and Hypotheses Emerged from Literature Review

Research Questions	Hypotheses
(i) Does PBL influence students' CT skill?	H_1 (1): There will be differences in their CT skill between students who follow PBL and TL.
(ii) Does PBL influence students' achievement on Business Education?	H_1 (2): There will be differences in their academic achievement between students who follow PBL and TL.
(iii) Does a relationship exist between the students' CT skills and their academic achievement?	H_1 (3): There is a relationship between the CT skills with academic achievement in Business Education.
(iv) Can students' CT skill be used to predict the students' achievement on Business Education subject?	

(v)   What are Business Education
       students' perceptions about the PBL
       implementation?

The next chapter presents a description of the research problem, the purposes, aims and objectives of research, the rationale of research, the importance of research followed by the research questions and research hypotheses. Finally, some limitations of the analysis are outlined and ending with the definition of terms used in these study.

CHAPTER 3

JUSTIFICATION OF RESEARCH PROBLEM AND METHODOLOGY

3.1   Overview

This chapter begins with a description of research problem, followed by the purposes, aims and objectives of research, the research objectives and rationale of research. The next section in this chapter would describe the importance of research that was divided into two sub-sections including a description of importance to the teaching profession and the importance to educational research, followed by the research questions and research hypotheses. Finally, some limitations of the analysis are outlined, ending with the definition of terms used in this study.

3.2   Research Problem

Based on its success in other disciplines like medicine, nursing, science, technology and engineering, PBL would appear to offer benefits for Business Education. Different instructional methods are used for different disciplines; for example, cooperative learning appears to evoke little interest in management education (7 citation) but tremendous interest in the educational profession (6,599 citations) (see Table 3 below). Conversely, the case study method has a large number of citations in business and educational journals but few in medical journals. On the other hand, there are very few PBL citations in business journals (39) compared to educational journals (958) and medical journals (1,671). The reason for this might be due to historical circumstances because cooperative learning developed in the educational area and the PBL developed in the medical field. Shortly after PBL introduction, three medical schools - the University of New Mexico (United States), the University of Limburg at Maastricht (Netherlands), and the University of Newcastle (Australia) - adopted the McMaster Model of PBL. Various adaptations were made and the

McMaster model soon found its way to various other disciplines (e.g., Dentistry, Health Sciences, Engineering, Law, Education, Business and so on).

Table 3:
Frequency of Citations of Instructional Methods by Discipline

	Business	Education	Medicine	Psychology
	Business Source Premier	ERIC Ebsco	Medline	PsychInfo
Cooperative learning	1	6,599	84	1,384
Project learning	0	113	4	13
Case method	214	713	82	184
Inquiry based learning	0	56	15	12
PBL	39	958	1,671	344

Adopted from: Coombs & Elden (2004, p. 525)

However, there seems to be slow progress from business faculty members to introduce this approach into their subjects (Banta et al, 2002; Bigelow, 2004). Based on a study by Bigelow (2004), only six undergraduate business courses had implemented this PBL pedagogy among 106 higher educational institutions in 2001 worldwide. Only two institutions in the United Kingdom have implemented this pedagogy in Business courses during that time which are Manchester Metropolitan University and Portsmouth University (PBL Insight, 2001, p. 14).

Lecturer centered teaching methods lead to less opportunity to engage students actively in the learning process. This is supported by Bonwell and Eison (1991), and Siegfried et al. (1991) who stated that active learning needs to be implemented to assist the learner to think like economists. Students who think like economists would

be able to understand the critical concepts, and this enhances CT, thereby increasing performance.

Many studies have stated the effectiveness of the PBL approach on students' CT skills (Chin & Chia, 2000; Neo & Neo, 2001; Ward & Lee, 2002; Kivela & Kivela, 2005; Yuan et al, 2008; Masek & Yamin, 2012), but these studies are mainly in the field of science and technology, especially in the medicine, nursing, sciences, hospitalities and engineering fields.

There is a lack of PBL studies in Business Education especially in Malaysia. From my search for information through reading theses, journal articles, conferences and symposiums proceedings, surfing the internet and library sourcing regarding PBL studies in Malaysia, I managed to find only three doctoral dissertations and two master's thesis reported on investigation of the effectiveness of PBL in various ways. The PhD dissertations include one which is based on PBL by Syed Anwar (2002), who explored the matriculation students' knowledge performance, dynamism and reasoning performance in Chemistry and another by Juremi (2003), who explored the secondary school students' thinking skills including creative and critical, science process and performance in Biology. The most recent study in Malaysia regarding PBL had been conducted by Sulaiman (2011). This analysis indicated that PBL approach could improve the thinking skills of students, but the study had been conducted on university students of physics. Another study had been done by Awang and Ramly (2008) and Salleh et al (2007) on Engineering Education. The study showed that students in PBL classroom had improved in their mastery of the content area and generic skills. Tan and Ng (2006) looked into the students' ability to think and respond strategically towards new venture creation in Entrepreneurship Education in Singapore.

In my opinion, this study is the latest in Malaysia which focuses on the implementation of PBL method among lecturers to improve student CT skills which is integrated into the Business Education courses. It includes a quantitative study using the quasi-experiment approach. The data was analysed constantly in order to explore and understand how Business Education lecturers and students inculcate the PBL method in applying problem solving skills and CT skills in teaching and learning

PEA 3063 – Population Economics and Policy course. This study is also aimed to find out the views of Business Education lecturers and students on the importance of inculcating CT skills, problems faced in implementing CT skills in teaching and environmental factors which motivate Business Education lecturers and students to implement CT skills in the teaching and learning of PEA3063 at Faculty of Management and Economics (FPE), UPSI (known in English as Sultan Idris University of Education), Malaysia.

3.3   Purposes, aims and objectives of research

Usually, research goals are described using broad statements of purpose. These goals attempt to capture the important aspects of the study and also establish the general direction of the inquiry. The purpose is formulated to provide a clear account of the research (Parahoo, 1997). In a quantitative study the key variables and possible interrelationships will be identified as well as the population of interest. The statement of purpose will be used to indicate the nature of the problem. It should be objective, indicate the intention to test the effectiveness of an intervention with an established knowledge base and should not indicate bias on the part of the research (Polit et al., 2006).

A research aim is a general statement of purpose which is divided into specific objectives to be achieved (Carter & Porter, 2000). These objectives explained in some detail what the study could be achieved.

3.4   Research Objectives

This research aims to focus on the implementation of PBL method among lecturers to improve students' CT skills using PBL methodology in PEA3063 – Population Economics and Policy in the FPE, UPSI, Malaysia. As the PBL method is new in Malaysia educational system, I explored the effectiveness of PBL by practice and implementation on students' CT skills through PEA3063 – Population Economics and Policy in lecture rooms. Next, this research identified the students' perception and

interest on the implementation of CT skills through PBL method. Other objectives include exploring the relationship between students' CT skill and students' academic achievement as measured by the PEA3063 – Population Economics and Policy through PBL.

3.5   Rationale for Research

The problem statement stated that learning is still done by lecture and memorisation in teaching and learning Business Education in Malaysia. It has also been found that learning deals with a lot of declarative knowledge that is required to be taught and learned. However, the CT method had been used in certain Business Education courses topics including the PEA3063 – Population Economics and Policy course (refer to 2.6.2 CT Skills in Tertiary Education and Teaching Approach in Malaysia, p. 57). Many studies relating to CT focused on the gain of knowledge and problem solving skills but it is not measured in or involves thinking skills. Conversely, creative and CT skills are also required in teaching and learning Business Education courses. Nevertheless the study about the effects of PBL implementation is still limited including the scenario in the Malaysian higher education institutions.

Presently, there is no such study in Malaysia which demonstrates the effects of using PBL method in Business Education courses as a teaching and learning strategy. This study focused on exploring and describing what happened when PBL is introduced and gaining empirical evidence to evaluate whether PBL proves to be effective to improve the students' CT skills and achievement of Business Education courses in Malaysia.

3.6 Importance of Research

This study seeks to address the importance of PBL to different potential audiences.

3.6.1 Teaching Profession

For the teaching profession, the research findings attempt:

a) to provide empirical evidence in support of the cognitive and affective effects of PBL method on student CT skills and academic achievement.

b) to provide an alternative to curriculum developers at Education Policy and Research Department, MOHE and higher education institutions to integrate and implement the PBL method in the teaching and learning of Business Education courses as a general aim if the findings of this study are accepted, and in the teaching of PEA3063 – Population Economics and Policy subject as a specific aim. CT skills concepts help to create a condusive teaching and learning environment on developing human resources related to the National Education Philosophy and National Mission.

3.6.2 Educational Research

For educational research, the findings attempt:

a) to gain additional research knowledge related with CT skills in Malaysia and to develop these skills among students that relate with the introduction of soft skills curriculum in higher education institutions if the findings of this study are accepted.

b) to reduce gaps in educational research evidence especially on Business Education courses that relate with CT skills.

c) to create academic research on CT skills fields on Malaysia educational system.

3.7   Research Question

The context of this research involves the need to enhance CT skills in Business Education students in Malaysia. The Business Education subject, PEA3063 – Population Economics and Policy provides the vehicle for the intervention-integrated with a PBL application. Therefore, the research questions for this dissertation are:

1.   Does PBL influence students' CT skill?

2.   Does PBL influence students' achievement on Business Education?

3.   Does a relationship exist between the students' CT skills and their academic achievement?

4.   Can students' CT skill be used to predict the students' achievement on Business Education subject?

5.   What are Business Education students' perceptions about the PBL implementation?

This dissertation reports on research done at the FPE, UPSI, where the selected lecturer taught Business Education course, PEA3063 – Population Economics and Policy, from July 2010 until October 2010. For PEA3063 – Population Economics and Policy course, three contact hours per week were involved, consisting of lectures and tutorials.

3.8   Research Hypotheses

The hypotheses are assumptions that the researcher makes about the expected relationship among variables (Creswell, 2009). These are numeric estimates of population value based on data collected from samples. Testing of hypotheses employs statistical procedures in which the investigator draw inferences about the population from a study sample. Hypotheses are used often in experiments in which investigators compare groups. Borg and Gall (1989) describe four characteristics that hypotheses should satisfy:

a)   the hypotheses should state an expected relationship between two or more variables;

b)   the researcher should have defined reasons based on either theory or evidence for considering the hypotheses worthy of testing;

c)   a hypotheses should be testable, and

d)   a hypotheses should be as brief as possible consistent with clarity (pp. 68-69).

The research hypotheses are:

H_1 (1): There will be differences in their CT skill between students who follow PBL and TL.

H_1 (2): There will be differences in their academic achievement between students who follow PBL and TL.

H_1 (3): There is a relationship between the CT skills with academic achievement in Business Education.

All these hypotheses were scientifically measured and later it was decided whether the acquired data would be accepted or rejected according to the hypotheses statement. The acceptance of hypotheses was decided according to significance level of $p < 0.05$.

3.9   Research Limitations

This study can be interpreted as an initial step in Malaysia; especially one that will contribute towards the research methods of teaching and learning CT skills through the PBL integrated into the subject PEA3063 - Population Economics and Policy at the tertiary level. However, the researcher realized the constraints encountered when carrying out this study. As put forward by Shayer and Adey (1990), to maintain the thinking skills by the students, it will require a longer learning period. Since this study was carried out within lectures and tutorials class that were common and available, as far as possible the researcher and lecturer as well as the students involved tried their best not to disturb the lecturing schedule that was set by the Academic Division, UPSI. The study had been limited to 14 weeks of implementation to ensure that it met the scheduling and planning activities of the academic semester.

The second limitation in this study is related to sampling. In view, this study used a Quasi-experiment survey and the number of students chosen as the subjects on this study was small with the aim to facilitate the control.   The sample of students chosen for PBL approach was limited to students who were registered for the course of PEA3063 - Population Economics and Policy according the list released by the Academic Division, UPSI.   The small number of students of 45 students (23 students for PBL and 22 students for the TL) may limit the generalization obtained from the findings. In addition, the position of the researcher as a lecturer at the FPE, UPSI may also provide direct implications to the research.   Undeniably, the researcher was acquainted with the selected lecturer involved in this experiment and this may create a bias element with the study route and the analysis of research findings. In this regard, the researcher had tried to minimize his personal involvement in the activities and events at the FPE, UPSI.

A further limitation is the process of how the students familiarize themselves in the new learning environment. Students who were registered for PEA3063 - Population Economics and Policy were the first group of student that would directly be involved in the use of PBL as a teaching and learning method. Undeniably these students had also been exposed to the TL method since their primary school education. This

situation might lead them (the PBL group) to become less prepared to accept this method of teaching and learning.

The fourth factor of limitation is the selection and the use of limited instruments in this study. The standard instrument used in the study to measure the CT skills of the students is the CCTST (CCTST-2000) (Insight Assessment California Academic Press; Milbrae, CA) and it is based on the Delphi Expert Consensus Definition of Critical Thinking (APA, 1990). The test was developed by Facione and Facione (www.insightassessment.com/test-cctst2k.html) who are considered experts in CT. The translation of CCTST into Malay language also may cause problems in terms of accuracy and grammar as well as appropriateness of their use within the context of understanding to the students in Malaysia. Whereas the students' performances in PEA3063 - Population Economics and Policy was designed and proposed by the subject lecturer with the help for the validity of the test contents from the expert on Population Economics and Policy.

With the limitations of study mentioned above, the findings and results of this study would need to be accepted carefully and future studies would need to be implemented and carried out to ensure the authenticity, support and strengthen the findings from this study. Findings from future studies can be used to support of refute these findings.

Another limitation was associated with measurement and evaluation procedures for the AAT (for mid-intervention and post-test). At baseline, both groups were given the same test for measuring achievement on the subject of Economics, which was a test evaluating what they had learnt in the previous semester. At mid-test and post-test, even though both groups completed the same instrument, this test was different from that used at pre-test: it was a new instrument evaluting the current subject (PEA3063 – Population Economics and Policy). The implications of this should be considered. One could argue that different instruments should have been developed since the groups were taught using different approaches, however the counterargument is that these should be made comparable, and there are various other considerations on this (e.g., lack of time and resources). This is important to note, as students were taught

using different teaching and learning approaches (PBL and TL), but their achievement was evaluated and measured using similar questions.

3.10   Definition of Terms

3.10.1 Effect

The main effects which were measured in the study are the cognitive effect, and an affective effect.   The affective effects were measured based on the ideas and interests of students or respondents through the use of the questionnaire on PBL methodology. Meanwhile, the cognitive effect involved the academic achievement and CT skills which were measured through the AAT and CCTST.

3.10.2 PBL

In this study, PBL McMaster Model by Barrow and Tamblyn (1980) was used as the basis for intervention. Based on this model, PBL involved three main stages:

a)   exposure to the problematic scenario

b)   search for information, and

c)   the discussion and new applications on the problems presented

The learning steps in the PBL consisted of the following:

a)   overview

b)   problems encountered

c)   problem definition

d)   exploration

e)   solution, and

f)   reflection

While the teaching steps using the PBL were as outlined below:

a)   The concepts to be learned would be listed

b)   The problems scenario would be presented to all the students (either in the form of images, situations, documents, audio-video, etc.)

c)   In small groups (between 4-5 persons), the students would analyze the information or ideas for the scenarios with the aim of identifying the existing information or ideas, or with a view to increase and search for a new information or ideas. In these steps, the process of brainstorming would be undertaken to allow students to define the problems and identify the variables which would take on the solution of the problems. In addition to which, students would also be able to identify the learning objectives relevant topic. Afterwards, the assignment or the subsequent action would be allocated between group members for process of seeking and the addition of information and ideas to solve problems.

d)   The student needs to look for information or ideas of reference resources and materials either by further reading, libraries, online research or other methods.

e)   After the information or ideas are obtained and collected using the diverse sources, members of the group would return to discuss and satisfactory consensus the final settlement and thus determine to ensure the learning objectives have been achieved. At the end of the learning session or discussion, reflections would be implemented to identify and verify the effectiveness of the learning for the topic or issues at that week. Throughout the learning sessions, the lecturer or facilitator would be engaged in monitoring and give a cognitive guidance for each group either by face to face sessions, online meetings or others medium that fit by the students and lecturer. In the process of monitoring and cognitive guidance, the lecturer or facilitator with his best efforts would use the questioning techniques on the students with the purpose to make sure the information or idea that was obtained would continue to develop.

3.10.3 Thinking Skills

The concept of thinking is a descriptive mental approach to describe how we think and it uses a combination of thinking skills in particular while attempting to solve the problem. The concept has been raised by Beyer (1991). What is stressed here is that the problem is assumed as the stimulation to start us thinking. The implementation of this process involved various steps in solving problems. The process starts by defining the problems and it is followed by searching for information, generating ideas and ending with an alternative solution. The thinking skills are divided into CT, creative thinking, analytical thinking, lateral thinking and so on. However, this particular study would only test the CT skills.

3.10.4 CT Skills

According to Huitt (1988), CT is the skill for conceptualization, to apply, to analyze, to synthesis and to evaluate the information. The information can be gathered by observations, experiences, reflections and communications. In this study, the increase of the students' CT skills means that there was an increase in the mean of students' post-test scores. The students' CT can be improved through the use of CT skill in problem solving method. As operational, in this study the CT skills was measured through CCTST and the completed instruments for the pre-test and post-test were scored by InsightAssessment Inc., which reported separate scores for each one of the skills or sub-scales; analysis, evaluation, inference, inductive and deductive reasoning.

3.10.5 Academic Achievement

In this study the performance would refer to the student's achievement in the prior-test, mid-intervention test and Post-test. The achievement was measured in the form of multiple-choice questions, subjective questions and short essay questions and these constructs according to Bloom's Taxonomy would include items such as the level of knowledge, comprehension, application, analysis, evaluation and synthesis. The students' CT skills and academic achievement could be improved through the implementation of PBL in the course PEA3063 - Population Economics and Policy.

The questions for the prior-test were multiple choice and they contained 40 questions covering the Fundamental of Economic (Microeconomics and Macroeconomics) that was undertaken by the respondents in the previous semesters. The Fundamental of Economics test was developed by the subject lecturer specifically for this work.

The questions for the mid-intervention test are in the form of a short essay and structured questions such as; list, ranking, scale etc. Generally these questions form part of the mid-semester examination which included five topics of the subject syllabus (half of the syllabus of PEA3063 - Population Economics and Policy – starting from week 2 until week 6).

The questions for the final semester test (post-test) contained 40 multiple choice items, 10 structure questions and 3 essay questions which included the whole syllabus of PEA3063 - Population Economics and Policy.

3.10.6 Perception of PBL

Perceptions in this study refer to opinions of students regarding the implementation of PBL as a teaching and learning approach for PEA3063 – Economics Population and Policy. Specifically, it is a learning outcome such as knowledge, the application and skills of knowledge, communication skills, work in group, students' as an independent learner, feedbacks on PBL methodology and also their open reflection or personal feedback regarding PBL approach.

The next chapter presents the methodology and research design used in this dissertation, the discussion in terms of the research experiment design, the sampling method, variables involved, validity of the research instrument and the case study, the procedure for the implementation of the study and how the data analysis was carried out.

CHAPTER 4

METHODOLOGY

4.1   Overview

This research focuses on the development of innovative teaching and learning methods for undergraduate students of Business Education.   Most importantly, the study sought to strengthen the CT skills for undergraduate students in Business Education through PBL applications, which focused on 'ill-structured' or the routine students face in everyday life and authentic problem-solving.   Additionally, the study aimed to develop an understanding of students' perceptions and interests toward PBL implementation, as well as lecturer perceptions and suggestions to improve teaching and learning strategies.

This section presents the methodology and research design used in this dissertation.   It also includes the discussion in terms of the sampling method used, the dependent and independent variables involved, the validity of the research instrument and the case study which was used in the PBL group, the procedure for the implementation of the study and how the data analysis was carried out.   This research is influenced by contemporary research methodologies in PBL for investigating the aspects of improving learning in Business Education especially PEA3063 – Population Economics and Policy course.   The researcher sought to develop a research methodology under an appropriate paradigm to provide relevant data to the context in which the research was conducted.

4.2   Research Method

According to Creswell (2009), quantitative research is a means for testing objective theories by examining the relationship among variables. These variables can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures. The quantitative method focuses on measurements and amounts (i.e. more or less, larger and smaller) of the characteristics displayed by the people and events involved in the research (Thomas, 2003).

According to Glesne and Peshkin (1992, p. 6), quantitative researchers seek explanations and predictions that can be generalized. Careful sampling strategies and experimental designs are aspects of quantitative methods aimed at producing generalisable results. In quantitative research, the researcher's role is to observe and measure, and care is taken to keep the researchers from contaminating the data through personal involvement with the research subjects. Researchers' 'objectivity' is of utmost concern.

Furthermore, according to Creswell (2009), in quantitative research, the problem is best addressed by understanding what factors or variables may influence an outcome. Additionally, in quantitative introductions, researchers sometimes advance a theory to test, and they will incorporate substantial reviews of the literature to identify research questions that need to be answered.

Recently these strategies of inquiry associated with quantitative research were those that invoked the post positivist worldview. Specifically, the researchers test a theory by specifying hypotheses and the collection of data to support or refute the hypotheses. An experimental design is used in which attitudes and variables are assessed both before and after an experimental treatment. The data are collected on an instrument that measures attitudes, and the information is analyzed using statistical procedures and hypotheses testing. These include true experiments and the less rigorous experiments are called quasi-experiments and correlational studies (Campbell & Stanley, 1963) and specific single-subject experiments (Cooper et al., 1987; Neuman & McCormick, 1995). Single-subject designs that include the use of experimental treatments also are included in quasi-experimental research (Wiersma,

1991) and have proven particularly relevant for defining educational practices at the level of the individual learner (Homer et al., 2005). Additionally, quantitative strategies have involved complex experiments with many variables and treatments and it may include factorial designs and repeated measures designs. These authors also included elaborate structural equation models that incorporate causal pathways and the identification of the collective strength of multiple variables.

Based on Creswell (2009), the quantitative approach is divided into two main strategies of inquiry:

a)   Survey research

It is a quantitative or numeric description of trends, attitudes, or opinion of a population by studying a sample of that population. Babbie (1990) suggested that it includes cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection, with the intent of generalizing from a sample to a population.

b)   Experimental research

Experimental research is used to determine if a specific treatment influences an outcome. This impact is assessed by providing a specific treatment to one group and withholding it from another and then determining how both groups scored on an outcome. Keppel (1991) provided an explanation that experiments include true experiments, with the random assignment of subjects to treatment conditions, and quasi-experiments that use nonrandomized designs. Single-subject designs are included within the quasi-experiments.

According to Kuhn (1961, p. 180), when measuring the departs from theory, the researcher will be likely to yield mere numbers. Kuhn further comments that the very neutrality of the numbers makes them particularly sterile as a source of remedial suggestions. Nevertheless, there is still a need to rely on numbers as numbers mark the departure from theory with a certain authority and finesse which cannot be duplicated by any qualitative technique, and that departure is often enough to start a search.

In this study, a quasi-experimental research method was implemented. In complex social situations it may be impossible to implement the true experimental method. Quasi-experimental studies are quite common in education (Wiersma, 1991; p. 16). This approach seeks to compare two groups of individuals who are thought to have similar characteristics, because the comparison groups are formed before the study and without random assignment, pre-existing differences between the groups could contribute to differences between the groups in their response to the treatment (Dimsdale & Kutner, 2004). According to Creswell (2009, p. 145-146), the basic intent of an experimental design is to test the impact of a treatment or an intervention on an outcome, controlling for all other factors that might influence that outcome. Additionally, as one form of control, researchers randomly assign individuals to a group. When one group receives a treatment and the other group does not, the experimenter can isolate whether it is the treatment and not other factors that influence the outcome (Creswell, 2009). As such, this study used a basic design of quasi-experiment method, thus two dependent variables (CT skills and students academic achievement) were being measured simultaneously for both treatment and control groups at three different times (pre-test, mid-intervention test and post-test). Treatment and control group are purposively selected from the current group based on pre-test scores (but for this study, the selection of group was based on distribution by Academic Division, UPSI) and other suitable characteristics in line with the study (Campbell & Stanley, 1963; Frankael & Wallen, 1996).

Four variables were measured simultaneously in both experimental and control groups on three different occasions. The design used is referred to as a "mixed between-within-subjects repeated measures design" (Tabachnick & Fiddell, 2001). As there are one set of between and two sets of within subject factors, it is referred to as a mixed design. The independent variables between subject factors were the teaching method whether it is PBL or TL. As for the within subjects repeated measures factor, this was acquired through pre-test, mid-intervention test and post-test scores for each dependent variable, which are CT Skill and the AAT for the PEA3063 – Population Economics and Policy subject.

This study took 14 weeks (one semester of studies) and it was implemented through this method:

- The pre-test (baseline) was given one week before intervention.

- A 14 weeks intervention was implemented.

- Mid-intervention test was given in week 8 of intervention (mid-semester test).

- Post-test was given one week after intervention complete (final semester test) – to test the retention.

The research design used is provided below:

Group	Intervention			
Experimental	O_1	X_1	O_2	O_3
Control	O_1	X_2	O_2	O_3

X_1 = PBL $\qquad$ X_2 = TL
O_1 = Pre-test $\qquad$ O_2 = Mid-intervention test
O_3 = Post-test

Table 4:

The design of mixed between-within subjects repeated measure used in this study

Group	Time		
	T1 - Week 1 Pre-tests: 1 week before intervention	T2 - Week 2-8 Mid-intervention tests: Week 8 of intervention	T3 - Week 9-14 Post-tests: 1 week after intervention
		Intervention implemented (PBL)	
Intervention Group (PBL)	CT (CCTST)	CT (CCTST)	CT (CCTST)
	Subject Achievement Test *	Subject Achievement Test **	Subject Achievement Test **
		No intervention	
Control Group (TL)	CT (CCTST)	CT (CCTST)	CT (CCTST)
	Subject Achievement Test *	Subject Achievement Test**	Subject Achievement Test **

*Subject Achievement Test: based on previous semester subject related to Economics

** PEA3063 – Population Economics and Policy subject achievement test

4.3   Study Variables

According to Creswell (2007), a variable refers to a characteristic or attribute of an individual or an organization that can be measured or observed and that varies among the people or organization being studies. The variables need to be specified in an experiment and it needs to be clear what group is receiving the experimental treatment and what outcomes are being measured. The variables classified into:

a)   Independent – one independent variable is the treatment variable; one or more groups receive the experimental manipulation, or treatment. Other independent variables may simply be measured variables in which no manipulation occurs.

b)   Dependent – is the response or the criterion variable that is presumed to be caused or influenced by the independent treatment conditions and/or any other independent variables.

Rosenthal and Rosnow (1991) suggest three prototypic outcomes measures: the direction of observed change, the amount of this change, and the ease with which participant changes. Through these prototypic measures, all the effect size from the different results of studies can be integrated with meta-analysis. Based on a suggestion by Colliver (2000), an effect size of 0.5 should be sought when measuring the effectiveness of PBL. Lipsey and Wilson (1993) in Richardson (2006) agree with Colliver view's, that an effect size of 0.5 would be more reasonable choice. However, Albanese (2000, p. 729) did not concur with the statement; "[e]ffect sizes of 0.8-1.0 are an unreasonable expectation from PBL". In this case, Cohen (1988) suggested a framework for measuring and comparing the effect sizes. He explained that an effect size is small (if 0.2), medium (if 0.5) and large (if 0.8). For this study purpose, I used an effect size of 0.5 for guideline measuring of effectiveness.

4.3.1   Independent Variable

Two types of independent variables were measured in this study:

a)   Teaching and learning strategies (groups) - The teaching and learning strategies compared are PBL and TL (referred to as PBL group and TL group

respectively). The independent variable is instructional method (i.e., PBL vs. TL). PBL is a situation whereby the learning activities would be decided by the students based on the problems given. On the other hand, the traditional method is a situation whereby teaching activities will be decided and fully controlled by the lecturer and knowledge will be fundamentally delivered through lectures. This is a between-subjects variable and it refers to the collection of pre-test, mid-intervention test and post-test data for every dependent variables namely; CT skills and students academic achievement.

b) Time - The time refers to the stage of intervention taking place. For the purpose of this study, a 14 week period was used to carry out the intervention. It comprises a pre-test, mid-intervention test and post-test. Pre-tests are under taken during the first week of the semester period before the actual intervention was implemented. Mid-intervention tests are conducted on week 8 of semester (after 7 week of actual intervention was implemented). This is also known as a mid-semester examination. The post-test was conducted a week after the whole actual intervention was completed (final-semester examination)

4.3.2   Dependent Variables

Two types of dependent variables were measured in this study;

a) CT skill performance – was determined based on the achievement scores in Pre-test, Mid-intervention test and Post-test using the CCTST (CCTST) [confidential] measurement tool comprising analysis, inference, evaluation, inductive reasoning, and deductive reasoning.

b) The AAT for the PEA3063 – Population Economics and Policy subject was measured using mid-intervention test and post-test which contain comprehension questions based on the subject topics that are included in this study. For the pre-test, the questions covered the principles of Economics such as Microeconomics and Macroeconomics that have been learned by the respondent's in the previous semesters to test their understanding and knowledge of basic Economics.

4.4   Data Analysis

According to Wiersma (1991), the results of a study are generated when the analysis is done. The field notes which have been collected are organized and synthesized at this point. The data are then summarized, manipulated, and in essence reduced so that they provide necessary information for description and hypotheses testing. Analyses of quasi-experimental studies are not as straightforward as analyses in experimental studies, and advanced statistical procedures need to be used to account for the lack of randomization in the comparison groups (Dimsdale & Kutner, 2004). Based on Gersten et al (2005), a key issue in such a study is ensuring that data analyses and research questions are aligned with the appropriate unit of analysis for a given research question. The determination of the appropriate unit of analysis relates directly to the research hypotheses and questions, the sample, and assignment of sample to experimental conditions. The researcher should clearly link the unit of analysis chosen to the key statistical analysis. For the purpose of this study, I applied both types of statistics, descriptive and inferential. Analysis was conducted using the Statistical Programme for Social Sciences (SPSS) version 18.0.

All pre, mid-intervention and post-test scores were analyzed to obtain the means and standard deviations (SD). In this study, each sample performance is measured repeatedly through the pre-test, mid-intervention test and post-test for all variables studied, i.e., CT skills and academic achievement, and the independent t test and mixed Analysis of variance (ANOVA) (Tabachnick & Fidell, 2007) were used to determine the group and time differences.

To answer Research Question 1, the independent-sample t test (to compare the mean score on some continuous variables, for two different groups of participants) and mixed ANOVA was conducted because there are three different levels (pre, middle-intervention and post-test) of independent variable and two groups of participants have been used in each condition to determine whether there was a significant differences between the PBL and TL groups in their CT skill as measured by the CCTST. The teaching and learning approach (PBL vs TL) was the between subjects variable, whereas the test instruments (AAT and CCTST) (at pre, mid and post-test) was the within subjects variable. To test this, SPSS performs Levene's test for

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equality of variances as part of the t test and ANOVA analyses. In order to do this before conducting any analysis, I checked a number of assumptions about the data (including Mauchly's test of Sphericity and Levene's test for homogeneity of variance). In one case where Mauchly's test statistic was significant the Greenhouse-Geisser's values were used instead.

To answer Research Question 2, an independent-sample t test was conducted to compare the two groups' academic achievement at pre-test, mid-intervention test and post-test. To support the results from an independent-sample t test, further analysis was conducted. It was decided that the researcher would conduct a series of one-way between groups analysis of covariance (ANCOVA) tests, where pre-AAT was used as a covariate when looking at differences between the PBL and TL groups in mid- and post-AAT. To test this, SPSS treated the scores on the prior-test as a covariate to control for pre-existing differences between the groups. Preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances, and reliable measurement of the covariate.

Spearman's rho correlations were used to determine whether there was a relationship between variables (CT skills or academic achievement). Due to the sample size and measurement level, ordinal data or ranked data were computed. This is useful because the data presented here does not meet the criteria for Pearson correlation. This analysis was used to explore whether higher CT Skills were associated with higher Academic Achievement scores at pre-test, middle-intervention test and post-test. The analysis from this procedure was used to answer Research Question 3.

The final step was to conduct Regression Analysis to see the percentage of contribution of student's CT skills to the academic achievement, and hence investigate whether students' CT skills could be used as a predictor for their academic achievement. The statistical analysis from this procedure was used to answer the Research Question 4.

As CT skills were measured by a pre-existing tool, the company (Insight Assessment Inc.) that developed the tool completes the scoring and provides the researcher with the CCTST overall and subscale scores for each student. The researcher also provided

an identification number for each student and CAPSCORE of Insight Assessment provided the percentile in which each person has been categorised.

Paired t tests were used for analyzing the potential differences in pre-test CCTST, mid-intervention test and post-test of CCTST measures within the groups. In addition, the pre-CCTST, mid-intervention-CCTST and post-CCTST were used to determine whether students coming into the program with relatively low CCTST scores improved more than those coming in with relatively high scores. A student's t test was used to compare mean changes in pre-CCTST, mid-intervention-CCTST and post-CCTST scores between the two groups.

4.4.1 Data from the Student Questionnaire (PBL Self-Assessment Questionnaire) [see Appendix B]

In order to explore Research Question 4, the "PBL Self-Assessment Questionnaire" was administered to the students in the experimental group (refer to 4.5.3 PBL Self-Assessment Questionnaires, p. 103). Analysis of the data from this Student Questionnaire was conducted and analysed using descriptive statistics such as frequencies, percentage and mean (standard deviation). The response scale for the closed-questions was a five-point Likert Scale, from Strongly Agree, to Strongly Disagree. The analysis was classified such as; overall preferences and perception of PBL; benefits of PBL; motivation; effects of PBL on problem solving and CT skills; and students' response toward CT skills on PBL method.

Other parts in the students' questionnaires contained the students response for the open-ended question, "please give your opinion as to how to improve the PBL method that you have already experienced". Whereas, for the analyzing the opinion from 'open-ended' Data of Students Questionnaire it was performed by the researcher based on the finding or ideas presented by participants of the study (PBL group. This method shows the accuracy and can be described as an expression of the feeling and emotion of the 23 participants in the PBL group itself. The researcher also made some changes and amendments regarding the terminology and the language used by the participants in the final report. This was because all the participants in the PBL group use the Malay Language when stating their views and opinions.

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4.4.2 Data from the Lecturer Questionnaire [see Appendix D]

The "Lecturer Questionnaire" contained open-ended questionnaires regarding their problems and suitability of using this method in teaching process and was analysed according to the overall responses.

4.5 Research Instrumentations

Before any data is collected, the necessary measuring instruments should be identified and discussed. According to Creswell (2009), during an experiment, the researcher makes observations or obtains measures using instruments at the pre-test or post-test stage of the procedures. Researchers should know how to discuss the instrument or instruments; the development, items, scales and report of reliability and validity of scores on past uses. As a researcher, we should also report on the materials used for the experimental treatment.

Some points to consider while using instruments and materials in an experiment; a) describe the instrument or instruments participants completed in the experiment, typically completed before the experiment begins and at its end. We should indicate the established validity and reliability of the scores on instruments, the individuals who developed them, and any permission needed to use them, and b) thoroughly discuss the materials used for the experimental treatment. A pilot test of these materials also has been discussed, as well as any training needed in administering the materials in a standard way. The intent of pilot test is to ensure that materials can be administered without variability to the experimental group (Creswell, 2009).

A review of the literature identified a number of established instruments which had been used to help test the different research questions and hypotheses. The chosen instruments are discussed in the following sub-sections. The instruments used included:

a)   California Critical Thinking Skills Test (CCTST, Insight Assessment) [confidential, cannot be published]

b) PEA3063 – Population Economics and Policy - AAT [see Appendix A(i, ii, iii)]

c) PBL Self-Assessment Questionnaires [see Appendix B]

d) Student Background Questionnaires [see Appendix C]

e) Lecturer Questionnaire [see Appendix D]

At the start of semester, mid-semester and at the end of semester, the research instruments except for Students Background Questionnaires (only given at the beginning or first week of intervention) and PBL Self-Assessment Questionnaires only given at the end of intervention) were distributed in a class session. The research instruments were completed during class time by all participants and collected by the researcher.

4.5.1 California Critical Thinking Skills Test (CCTST) [confidential and cannot be published]

The instrument used in the study to measure the CT skills of the students was the CCTST (CCTST) (Insight Assessment, California Academic Press; Milbrae, CA) and it is based on the Delphi Expert Consensus Definition of Critical Thinking (APA, 1990). The test was developed by Facione and Facione (www.insightassessment.com/test-cctst2k.html) who are considered experts in CT and it is aimed at college or graduate students and adult professionals. The CCTST was administered in the English version using the pencil-and-paper format. The concept of CT is defined as a combination of attitude, knowledge, and ability comprising:

a) analysis;

b) inference;

c) evaluation;

d) inductive reasoning, and

e) deductive reasoning.

The researcher has decided to use the CCTST because it is been used extensively in the United States and has been translated in many languages around the world such as Arabic, Chinese, Dutch, French-Canadian, Hebrew, Indonesian, Italian, Korean, Portuguese, Spanish, Thai, Turkish, and Vietnamese (so far, there is no translation in Malay Language). The CCTST has been proven to predict strength in CT in authentic problem situations and success on professional licensure examinations. It is also suitable to be used for postgraduate students, as well as undergraduate students in all fields (Choi, 2004; Coker, 2010; D'Antoni et. al, 2010; Evens & Bendel, 2004; Kaddoura, 2011; Lesperance, 2008; Loy et. al, 2004; Ozturk et. al, 2008; Pastirik, 2006; Salah Al-Fadhli & AbdulWahed, 2009; Tiwari et. al, 2006; Velde et. al, 2006; Wheleer & Collins, 2003; Yuan et. al, 2008). The CCTST is a discipline-neutral measure of reasoning skills.

The CCTST items invite test-takers to analyze or to interpret information presented in text, charts, or images; to draw accurate and warranted inferences; to evaluate inferences and explain why they represent strong reasoning or weak reasoning; or to explain why a given evaluation of an inference is strong or weak. Two forms of the test are available. For the purpose of this study, I used Form CCTST-2000 in the paper and pencil format. The test consists of 34 multiple choice short problem statements and scenarios that are discipline neutral. The test targets the core CT skills (analysis, evaluation, inference, deductive reasoning, and inductive reasoning) which are considered to be essential elements in a college education. The questions range from the basic analysis of the meaning of sentences to more complex integration of CT skills (Facione, 1990). The target of these multiple choice tests are core CT skills which are essential to the kind of thinking and reasoning required to decide what to believe or what to do in novel problem situations. The students are required to complete the questions in 45 minutes. One point is given for each correct answer, with the maximum score being 34. The test generates a total score and five subscale scores. When a person manages to score above 20, he or she is considered to have high CT skills; 15–19, medium CT skills; and below 14, low CT skills. Together CCTST provides a measure of overall CT and a measure of five useful skill descriptions that can be used for guiding staff development and curriculum development.

The reliability of the test was established with a Kuder Richardson value of 0.68 to 0.75 (Facione et al., 1998). A group of evaluators (Cook et al., 1996) of CT assessment tests available in the market ranked the CCTST as having moderately high validity and feasibility. The completed instruments for the pre-test and post-test is scored by Insight Assessment, the testing institute which owns the copyright to the CCTST, which reports separate scores for each one of the skills or sub-scales: analysis, evaluation, inference, inductive and deductive reasoning, and a total score of overall CT ability.

The sample of this research, consisting by the treatment (PBL) group and control (TL) group completed the CCTST. In order to identify any changes in CT scores across the curriculum, performance on the pre-test, mid-intervention and post-test CCTST measurement was used. This provided the opportunity to evaluate changes in the students' CT skills score over the length of the didactic curriculum and to compare their scores to UPSI assessment norms. The CCTST was given to the two groups of respondents during regularly scheduled classes and proctored according to the directions provided by the Insight Assessment. Later, the CCTST were hand graded and entered into a database for analysis.

The researcher had been using the CCTST–English together with the back-to-back translation of the Malay Language with the objective to make sure all the respondents fully understand these questions given. This was necessary as English is not the main medium of instruction in Malaysia, and the back-to-back translation of Malay Language provided would be able to reduce the problem of understanding amongst the respondents. As regards the back-to-back Malay Language translation, the researcher made his own initiative and this was reviewed by a registered translator from the Malaysian Institute of Translation (ITNM). The back-to-back translation was performed with these without the official verification from the copyright holder, Insight Assessment because the process to obtain the consent for the foreign translation from the copyright holder of CCTST would have taken a considerable amount of time and energy, which was out with the scope of this doctoral thesis. The respondents were required to use the CCTST–English as a primary script and Malay Language as guidance when they experienced difficulties understanding the questions and they also have a chance to seek guidance from the lecturer involve (Dr. X). As

the researcher, I also gave a hand to students to help them understand in depth regarding the questions in CCTST script.

4.5.2   PEA3063 – Population Economics and Policy (AAT) [see Appendix A (ii) and A (iii)]

This was to be used to measure the students' performance in PEA3063 – Population Economics and Policy before and after the end of the experimental period [(week 7) – mid-semester examination and one week after end of intervention (week 15) - final semester examination] based on the knowledge which they have gained during the experiment. The questions for the pre-test [see Appendix A (i)] were multiple choice and they contained 40 questions covering the Fundamental of Economic (Microeconomics and Macroeconomics) that was undertaken by the respondents in the previous semesters.   The Fundamental of Economics test was developed by the subject lecturer specifically for this work. The main purpose of administering this pre-test was to investigate students' prior knowledge in basic of Economics for both groups before intervention.

The questions for the mid-intervention test also were developed by the subject lecturer. The questions are in the form of a short essay and structured questions such as; list, ranking, scale etc. Generally this questions form part of the mid-semester examination which included five topics of the subject syllabus (half of the syllabus – starting from week 2 until week 6) [see Appendix E].

The questions for the final semester test were designed by the subject lecturer with the help for the validity of the test content also from the expert on Population Economics and Policy. The mean scores were used to compare the performance of the PBL group and the TL group. This Achievement Test was developed with the help of subject lecturer. The test was in the form of criteria reference test based on the Bloom's Taxonomy (low cognitive or high cognitive). For example, low cognitive questions such as comprehension, the questions included explain, interpret, discuss, distinguish, predict, restate, translate, compare and describe. However, for higher cognitive questions such as analysis, it included analyse, examine, compare, contrast,

investigate, categorise, identify, explain, separate and advertise. While designing this final test, the subject lecturer had referred to various sources like the PEA 3063 – Population Economics and Policy syllabus, main book reference, additional book reference, Internet and previous semester test. The test specifications or Jadual Penentu Ujian (JPU) had been constructed based on 40% on knowledge level and comprehension, while another 60% is based on the application, analysis and synthesis of thinking skills. The instrument contained 40 multiple choice items, 10 structure questions and 3 essay questions.

The validity of items would be examined through three levels;

a)   Firstly, the content and test items were referred to two experienced facilitators/lecturers and an expert in constructing questions on PEA 3063 – Population Economics and Policy.

b)   Secondly, the test items were tested using a pilot test and then analysed.

c)   Thirdly, the items were revised according to the results of the pilot test and after being referred to the expert in constructing questions on PEA 3063 – Population Economics and Policy and also after the approval from the faculty and university examination board.

The test items were tested using a second pilot test and the final improvement was made. The difficulty index (Indeks kesukaran - IK) and discrimination index (indeks diskriminasi - ID) of each item were calculated from the second pilot test. The difficulty index of items is between 0.32 and 0.76, and this is the average level that can be accepted. The discrimination index is between 0.38 and 0.63, and this shows a high positive discrimination and the most suitable. The best value for difficulty index is between 0.40 and 0.60 and for the discrimination index is 0.40.

4.5.3   PBL Self-Assessment Questionnaires [see Appendix B]

The main objective of this questionnaire was to get a response from students about their interest in the PBL method in terms of the learning outcomes they felt and they gained as a result of the intervention. This questionnaire contained 36 items with a Likert-type response scale (from 1 to 5) and one item open-ended question. The questionnaire was developed by the researcher based on the references, assessment adapted from previous studies (Juremi, 2003; Heather, 2008; Lesperance, 2008). The face-validity method was used to measure the items as suitable and easy to understand. All items had been designed according to steps and components of PBL, CT skills and understanding on subject. The reliability analysis was acquired first to measure all the items is suitable. Cronbach's Alpha for pilot test was .947, showing a high internal consistency. Therefore, it is believed the development of these questions have a good reliability. The information gathered was used for the detailed comment on data from the measuring instrument which was used to measure the level of CT skill in CCTST. It also was used to assess whether the perceptions regarding PBL gave an effect towards CT skills.

4.5.4   Student Background Questionnaires [see Appendix C]

To provide background and contextual information, a general questionnaire was given to all students in both groups at pre-test. This questionnaire contained information about students' background including major or minor of study, the higher grade achieved in all Economics subject that the respondents had already taken during their study and question regarding the respondent's understanding about the CT skills during the implementation of the module PEA3063 – Economics, Population and Policy through the PBL method. However, only the information from the student background including their gender and pre-entry level of Cummulative Grade Point Average (CGPA) (previous semester) was included in the analysis of findings.

4.5.5   Lecturer's Questionnaire [see Appendix D]

This questionnaire contained four open-ended questions. In this questionnaire, the lecturer was asked to explain the views and understanding comparison between PBL method and traditional method in, problems or limitations when using PBL method, benefits or advantages of PBL method and also to provide suggestion on how to improve the PBL method.

4.6   Research Implementation

The study was implemented within 14 weeks. The implementation procedure for the experiment group (using the PBL method) is explained in Table 7 below.   The procedures for the control group (using the traditional method) are discussed later in this section.

In the first week, the Pre-test was administered to the students who registered for PEA 3063 – Population Economics and Policy. Next, the students were assigned to two different classes, forming the two groups, intervention and control. The allocation of students was done according to their final overall Cumulative Grade Point Average (CGPA). Each group contained a random sub-sample of 4 to 5 members from four ability levels e.g. CGPA of 2.00 - 2.50 (low level), 2.51 - 3.00, 3.01 - 3.50 and 3.51 - 4.00 (distribution from Academic Division in the early semester based on the students who had registered to enrol in this course). Each group would remain as such until the end of the experiment.

The intervention period began in the second week of the semester. The subject lecturer instructed the experimental group using PBL while the control group used the traditional method of learning. The lecturer covered certain topics related to PEA 3063 – Population Economics and Policy.   The students in experimental group and control group received identical syllabus prescribed learning content (for 14 weeks) [see Appendix E]. Each group had at least three hours of lectures per week. A lecturer who is qualified and experienced in teaching subject PEA 3063 – Population

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Economics and Policy was involved. The experimental group used the PBL module within the 10 week period. In each week they had three hours meeting/class and the focus would be on solving activities of PBL cases [see Appendix F].

4.6.1   Class Observation and Monitoring

Planned observation and monitoring was implemented for the whole class (PBL and TL group) to ensure that the involved lecture would follow all the activities planned by the researcher. The meeting and discussion between the researcher and the involved lecturer for the experimental group (PBL) was planned every four weeks. This was necessary in order to identify potential problems or issues how they could be resolved. As for the control group (TL), they would follow the usual teaching and learning process as a planned by the involved lecturer.

According to Burns (1991, p. 80), observation and monitoring is the process 'of taking regular and conscious notice of classroom actions and occurrence which are particularly relevant to the issues or topics being investigates'. This enables the researcher to gain personal insight into the lecture and tutorial activities and help to build a deeper understanding in order to provide a framework to support possible answers to the research questions. A great strength of observation and monitoring is that it allows the researcher to reflect on actual occurrences in the lecture and tutorial room. As Burns (1991, pp. 81-82) points out, it builds new 'perspectives [...] on familiar situations [and...] allows us to see in relatively unobtrusive way what it is that peoples actually do compared with what they say they do'.

More specifically, I took note of the learners' lecture or tutorial arrival and departure times, their discussions, body language, and their time spent 'on task' as well as and their contribution. As outlined later (Section 4.6.2 and 4.6.3), detailed field notes were taken of all activities, notes were dated and organised in categories. These direct, first-hand monitoring and observations of every class provided a way of understanding group behaviour within the class (e.g. communication, peer interaction, inter/intra-personal skill etc) and high face validity to the study. This monitoring and observations were used as supporting notes while reporting the findings of this study.

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An important point to make here relates to potential influences on participants' behaviour. The literature suggests participants may be influenced by what is termed the 'Hawthorne effect' (an unavoidable bias that the researcher must try to take into account when analyzing the data) (Bogdan & Biklen, 1982). During this time, I, as the observer, was aware that my presence might influence the behaviour of research participants. To help reduce the effects of this phenomenon, where participants might change their actions due to the attention they are receiving from the researcher and while they are aware they are subjects of a study, I tried to maintain a low-profile presence. I also made a conscious effort to take account of the influence of the act of observing or monitoring the participants (especially students) and its effect on students' behaviour in the lecture or tutorial. This is important as the fact that they are part of an intervention in itself can lead to improvements in learning outcomes (i.e., as opposed to the particular features of the intervention itself). The 'Hawthorne effect' might have been mitigated in some ways in this study by undertaking the research during usual class times specified in the program.

4.6.2   TL Method Implementation Procedure

Students in the TL group (the control group) followed the traditional teaching and learning method used for PEA3063 with the lecturer still playing an important role. With this class the lecturer delivered the content of the subject based on the stated topics, gave the explanation and tried to solve any problems which may occur.

The traditional PEA 3063 – Population Economics and Policy instruction would involve a typical lesson with a lecture and questioning methods to teach the concepts related to the topics of Population Economics and Policy. The students would have to study the reference books or materials on their own before the lecture hour.

The lecturer structured the entire lecture as a unit, using notes or PowerPoint presentation about definitions of concepts related to the topics of PEA 3063 – Population Economics and Policy. Then he described and defined the concepts and, after his explanation, the students discussed with their classmates while the facilitator or lecturer directed questions to them. For most of the instruction time, the students were at the receiving end of the lecture and became engaged in two-way teacher-

student discussions stemming from the lectures explanation as well as getting involved in the questions session.

The students were also required to complete individual assignments in the lecture hall or tutorial rooms and they themselves corrected the assignments during the lecturer's discussion of the topic in the tutorial.

During all traditional sessions, the researcher remained in the lecture room and gave assistance when needed. The control group was monitored to make sure all the activities were implemented as a planned. The implementation of monitoring was done to ensure the lecture did not change the teaching method. The researcher took down notes on monitoring [see Appendix G] to ensure that the process can be verified if there are any problems in the intervention in the future.

4.6.3   PBL Method Implementation Procedure

The PBL module was designed to be implemented in the 3 hour weekly lecture period. The implementation procedure as used with the intervention group (using the PBL method) is explained in Table 7 below. In the beginning stage, the procedure was started with the lecturer attracting the students' attention by giving a problem to the students [see Appendix F]. The students were given one minute to discuss with each other how they would solve the problem (discussion method). The problems had been provided using various sources like the using of documentations, video display, pictures, stories and others as long as it can be made authentic. After this step, the students were asked to draw a mind-map related with the learning topics. This briefing was aimed to help students focus on the problem at hand also as an orientation process to what they learnt.

After the problem had been given to the class the students were asked to form groups of 4 to 5, each consisting of members of all achievement levels. These groups remained for the whole semester. The students discussed and negotiated among themselves the learning objectives on that day. They also discussed and decided upon the issues that needed to be solved and how to gain relevant information.

In this study, the researcher provided the reference material in order to make the learning process easier, especially since the time was rather limited. The students also had been asked to prepare and refer with main references, lecture notes and online materials. The searching of material would be done as an individual task. The information gained would be discussed and negotiated with the group on how to solve the problem. After that, the students had a discussion again with their group to examine the problem was solved. These activities were only implemented in PBL group, whereas the TL group only involve in face-to-face discussion with lecturer within the lecture period.

During all PBL sessions, the researcher remained in the lecture room and gave his assistance when needed. The experimental group was monitored to make sure all the activities were implemented as planned. The implementation of monitoring was done to ensure the lecture did not change the teaching methodology. The researcher took down notes on monitoring [see Appendix G] to ensure that the process can be verified if there are any problems in the intervention in the future.

At the end of lesson, each sub-group of 4-5 students had 10 minutes to reflect on their learning and to conclude on what they have learnt. To reinforce their knowledge, the students were asked to redraw and modify their concept map (already constructed at the beginning of the lesson) with the new knowledge if they have. Every week (1 hour), a formal tutorial meeting was held between the lecturer or facilitator and PBL group to discuss any problem arising during the intervention and to finalize the concept map of solution. This concept map was handed over to be checked by lecturer.

Table 5:

Teaching Method Using PBL in one Lesson (in this research)

PBL Phase	Lecturer Activity	Student Activity
Introduction Orientation	Lecture started the teaching: 1. Providing the problem bank sheets and choosing the problem to be discussed in class that day. 2. Explaining briefly the problem statement related with the topic content and the thinking skill to be learnt. 3. Grouping the students into groups of 4-5 people.	. 1. Listened to the lecturer's explanation and referring to the problem bank. 2. Searched for reference materials. 3. Put into groups.
Active Thinking Brainstorming Idea re-structuring Idea application	Lecturer as a facilitator moved from group to group to give a cognitive guidance. Lecturer checked student answer/ideas. If the answer/idea is not suitable, lecturer give a question to enable students to find the exact answer/idea/solution.	1. Tried to solve a problem with a group: 2. Defined the problem 3. Explored the task to solve the problem
Thinking about thinking Reflection	Meta cognitive activities were used to assist student to think about thinking process. Lecturer asked direct questions to student to encourage them to reflect: 1. Type of thinking/thinking skill that was implemented. 2. How thinking/thinking skill was implemented. 3. What aspects of Population Economics and Policy module learned while brainstorming and examining the problem given.	1. Student re-evaluated the problem that was been solve. 2. Answered the questions given by lecturer. 3. Created a concept mind/notes / mind map about Population Economics and Policy knowledge that has been learned. 4. The learning materials were to be stored as an individual task and needed to be handed over to lecturer at the end of semester. Students presented the discussion outcomes every week in front of class. Provided a handouts copy to each group of students in PBL class. Send a final report to instructor for assessment.

At the end of each PBL session, the aim was for all groups to come up with a solution such as the one shown in Table 6 below.

Table 6:

Solution Method Using PBL in one Lesson (in this research)

Approach PBL	Example of task	Process & learning Outcomes
The problem presented		
Define the problem		
Exploration		
Problem Solving		
Reflection		

4.6.4   Training for the Lecturer to Conduct PBL

The lecturer selected to teach the experimental group was provided with a training session to handle PBL which he successfully completed. This training included an introduction to PBL, video display and PBL simulation (Chart 1 below).   The PBL introduction also included the background of PBL, exposure and training about teaching strategies to solve a problem, CT skill and questioning techniques in the application and analysis level. This procedure took two hours. This was followed by two hours of video display. To make sure that the selected lecturer fully understood and felt comfortable to handle the PBL class, this training was ended with a two hour PBL simulation.   In this simulation, the selected lecturer had implemented the understanding and knowledge to utilised PBL in class. Materials for this training also included an instruction book [see Appendix H] that contained introduction to PBL, questioning style and CT skill notes.

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┌─────────────────────────────────┐
│ Explanation to PBL (2 hours)    │              ┌──────────────────┐
│  • Background                   │              │                  │
│  • Problem solving strategies   │ ───────────▶ │   Reflection     │
│  • CT skill                     │              │                  │
│  • Questioning techniques       │              └──────────────────┘
└─────────────────────────────────┘
               │
               ▼
┌─────────────────────────────────┐
│ PBL video display (2 hours)     │              ┌──────────────────┐
│  • Lecturer simulation          │              │                  │
│  • Implementation of PBL in the │ ───────────▶ │   Reflection     │
│    class                        │              │                  │
│  • Implementation of PBL out of │              └──────────────────┘
│    class                        │
└─────────────────────────────────┘
               │
               ▼
┌─────────────────────────────────┐              ┌──────────────────┐
│ Simulation (2 hours)            │ ───────────▶ │   Reflection     │
│                                 │              │                  │
└─────────────────────────────────┘              └──────────────────┘
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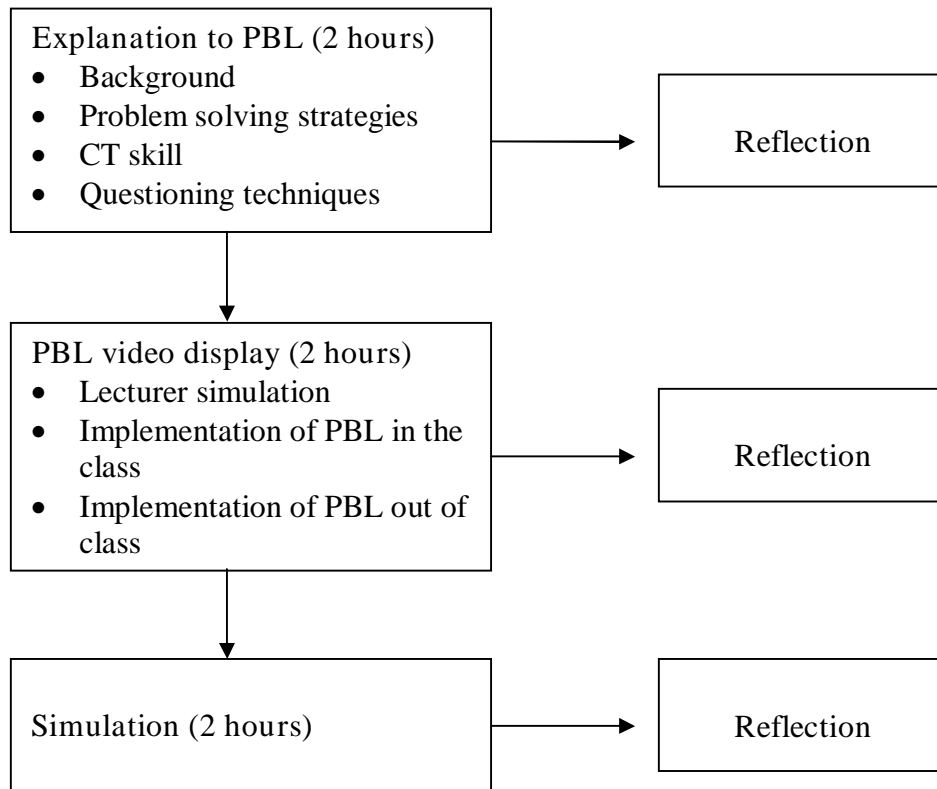
Chart 1:
Lecturer Training Procedure

4.7   Pilot Test and PBL Module Pilot Test

The pilot test was implemented within four weeks and it was used to modify the PBL module that had been design by the researcher and module lecturer. This pilot test had been conducted among students who were not involved in the actual test. During the implementation of the pilot test, the PBL modules were continuously subjected to examination process, trial and modification, a process in which a Senior Lecturer (Professor) in Population Economics and Policy was involved.

The characteristics which were checked in the pilot were content, terms and suitable language and how well it matched with the syllabus. The weaknesses of the problem statements, if there were any, were also checked. Feedback from students helped the researcher to make the PBL module more reliable and easy to use within the lecture time and also to ensure that the level of difficulty was moderate to make sure students can complete the task within the learning time (3 hours).

4.7.1   Research Instruments for Pilot Test

To measure the validity and reliability of all the research instruments and the need of timing to administer this study, the pilot test was conducted among 20 respondents. The pilot test respondents would have the same characteristics but they were not been involved in actual studies. The participants involved in the pilot test were the students who had registered in this subject for previous semester (on Semester II, 2009/2010 Session).   After the pilot test, some of the respondents were interviewed by the researcher to get feedback on whether they had any language difficulties when answering the questionnaire. From this feedback, the researcher made some modifications on the questionnaire and the research instruments.   Research instruments had been modified when necessary to gain the validity and reliability indexes. A summary of this process is shown in Chart 2 below;

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                          ┌─────────────────┐
                          │  Searching the  │
                  ┌───────│  information from│───────┐
                  │       │  multi-sources  │       │
                  │       └─────────────────┘       │
                  ▼                                   ▼
         ┌─────────────────┐              ┌─────────────────┐
    ┌───▶│ Designed/modification│         │ Designed/modification│◀───┐
    │    │  of instrument  │              │  of module/cases │    │
    │    └─────────────────┘              └─────────────────┘    │
Unsuitable      │ Suitable              Suitable │          Unsuitable
    │           ▼                                 ▼               │
    │    ┌─────────────────┐              ┌─────────────────┐    │
    └────│                 │              │   Teaching the  │────┘
         │   Pilot test    │              │    PBL class    │
         └─────────────────┘              └─────────────────┘
                  │                                 │
                  ▼        ┌─────────────────┐      ▼
                  └───────▶│ Actual research │◀─────┘
                           └─────────────────┘
```
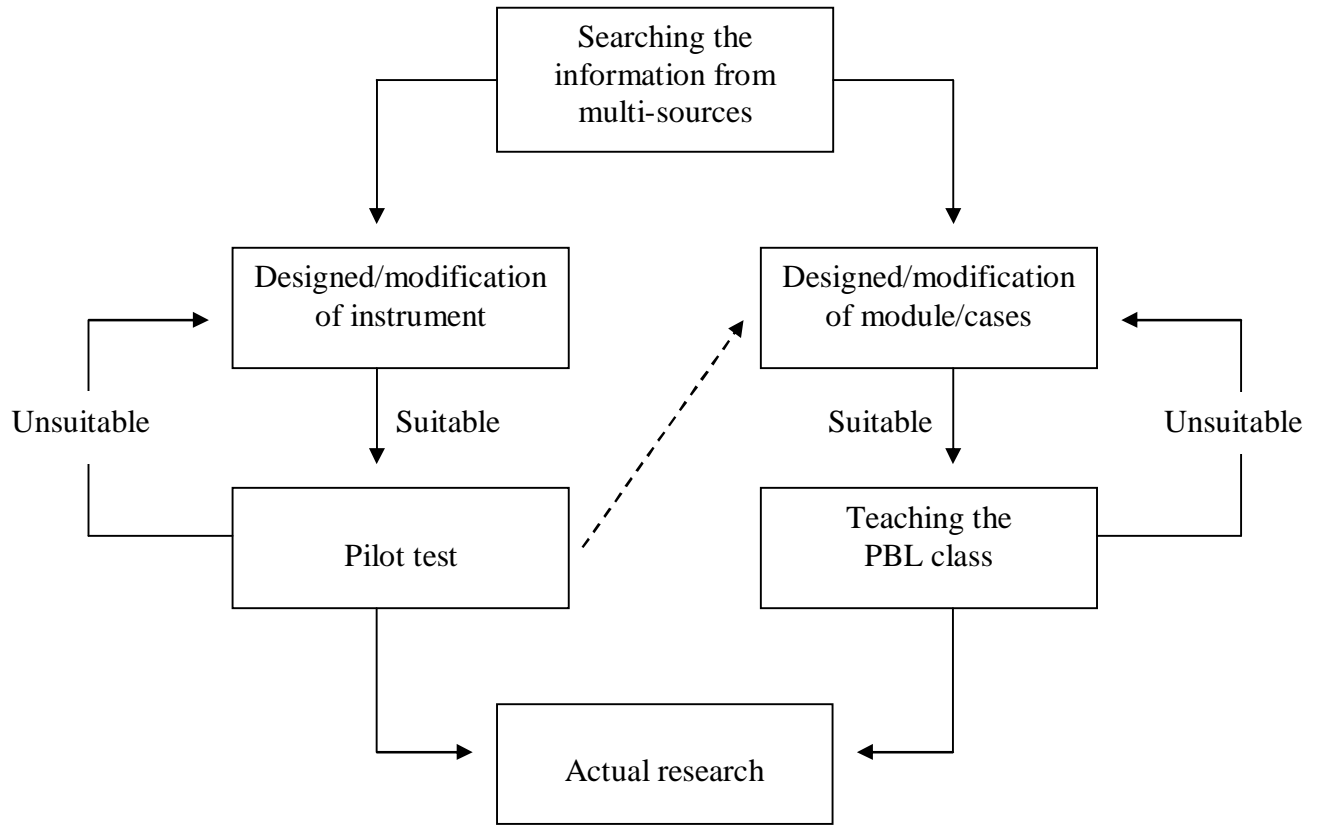
Chart 2:
Pilot Test Procedure

4.8   Internal Validity for the CCTST

Validity – the ability of an instrument to measure what it is supposed to measure (Youngman & Eggleston, 1982; Sax & Newton, 1997). This refers to the suitability and the strength of the test score interpretation as well as other assessment results, by referring to the content validity, predictive validity, concurrent validity and construct validity (Fraenkel&Wallen, 1996).

The summary for the types of validity used and the methods used for determining the validity adopted from Mokhtar (1995), Mohamad Najib (1999) and Salkind (2000) is shown in the Diagram 1 below;
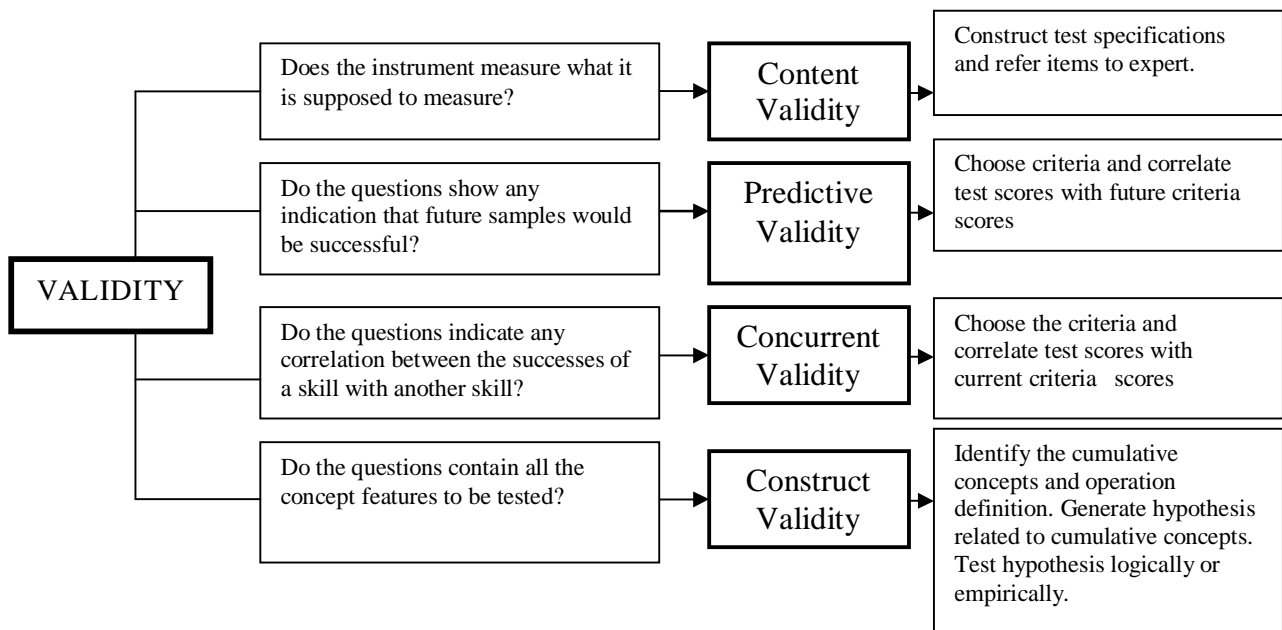
Diagram 1:
 Types of Validity

The selection of students was based on the current class (based on distribution by Academic Division) and the mean score is the same in all pre-test. The number of students according to gender (male and female) had been allocated by Academic Division, UPSI automatically when the students registered to take the course. This is to ensure the selection of sample is not biased. The intervention was conducted within 10 weeks to reduce the internal threat that would be caused by maturity or history of samples. This period of time is considered not too long or too short.

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To reduce the 'test wise effect', CT skill tests were administered in three types of alternative test of CCTST. A suitable gap of time to administer the test was considered: one week before intervention, week seven of intervention (mid-intervention) and one week after the intervention.

To reduce the 'Hawthorne effect' this study was conducted on a regular learning time as stated on the lecturer or students' time table. During the implementation of this study, the researcher monitored both groups, experimental and control. Both groups of study were prepared with the same reference materials for PEA3063 – Population Economics and Policy subject.

To reduce attrition, the lecturer was asked to ensure the students' attendance in the lecture class as compulsory was stated in the university time-table. All pre-test, mid-intervention test and post-test were conducted during lecture time.

There is a possibility that the research instrument may affect internal validity. The CCTST used in this study were standardised in English language for Western background and it was measured using multiple validity process. All the research instruments were administered and managed by the lecturer involved. The lecture was provided with instruction and guidance on how to manage and administer the research instruments. The CCTST for pre-test, mid-intervention test and post-test were marked and analysed by the copyright holder, Insight Assessment Inc at the end of intervention (CAPSCORE) [confidential, cannot be published] and the PEA3063 – Population Economics and Policy Achievement Test sheets were marked by the involved lecturer according to the scheme of marking (issued by the Academic Division based on scheme by Question Makers).

4.9   Ethical Considerations

To better protect the rights of the research participants and fulfil certain consideration regarding ethical issues, before the actual study was carried out, the researcher submitted the necessary forms and research proposal to Department of Educational and Professional Studies, University of Strathclyde Ethics Committee for revision and approval [see Appendix H).

Initially, in Malaysia, like in many other countries, the researcher must get permission to conduct any study at public or private higher learning institution before gathering any information. This is based on suggestions by Bell and Day (1991):

> "...permission to carry out an investigation must always be sought at an early stage. As soon as you have an agreed project outline and have read enough to convince yourself that the topic is feasible, it is advisable to make a formal, written approach to the individual and organisations concerned, outlining your plan. Be honest. If you are carrying out an investigation in connection with a diploma or degree courses, say that is what you are doing"
> (p. 37).

Before the present study was implemented, the general principles of this study had been discussed with the Dean of the FPE and the Head of Department of programme who then approved and supported the project of developing the proposal and the intervention process. Full permission from UPSI was requested and obtained [see Appendix J] to approach the potential participants who were in their final year Bachelor of Education (B. Ed Economics).

The request for ethical approval [see Appendix J] included an explanation of the study, its rational and method.   Other items included were the copies of the tools to be used and a synopsis of the proposed study. After the study had been completed, a summary with some of the main findings from the study in aggregated format was sent to UPSI.

Two other important ethical issues that I attended to were the principle of informed consent and that of voluntary participation (De Vaus, 2002). In particular before the research instruments were administered, the purpose of the research was explained to the participants by the researcher and this was supported by the students' informed consent. Abiding to Ethical guidelines, information about the study was provided to every participant through the informed consent. The students were given the opportunity to consider and determine their willingness to participate. In line with ethics requirements, all participants submitted a signed informed consent [see Appendix K] before getting involved in this study. Continuous consent was sought throughout the study, in case there were any participants that changed their mind about participation mid-intervention. Berg (2007, p. 58), refers to the informed consent as 'the assurance that subjects are voluntarily involved and informed of all potential risks'. De Vaus (2002) indicates a range of matters that participants should be informed about, such as:

- The identity of the researcher
- The aims of the study
- An outline of any risks, embarrassments or discomforts
- An offer to answer any enquires related to the study
- A statement that participation is voluntary

As stressed above, it was made clear that participation was voluntary and that participants can withdraw from the study at any time without any consequences. After the second week of the intervention, two students from the control group (TL) withdrew from the study after they decided to deregister for the PEA3063 module. Their data were excluded from the final dataset.

Another ethical issue permanent in this study is one that links to the research design of the study, and specifically the use of a control and an intervention group. As Bell (1993) describes when referring to experimental and quasi-experimental designs, participants are divided into a treatment and a control group in order to allow comparisons between the two. In this study comparisons were made on their CT skills and the allocation to these groups was done at random by the Academic

Division, UPSI. This was an important aspect of the study, as random allocation to the treatment and control groups at the beginning of the study can help maximise the probability that they do not differ in any systematic way. This situation, where two groups are taught the same module using different approaches (PBL vs. TL), provided a unique opportunity to measure the effectiveness of the PBL approach. It is more appropriate that the researcher in this study gave the opportunity for both groups (PBL and TL) to use both teaching approaches. This is to ensure the homogeneity and similarity in the teaching and learning process because the participants in this study were taught the same syllabus and their learning was measured and assessed using same approach. However, even though this is a useful practice methodologically, it does pose some ethical issues, as discussed below.

In order to ensure sufficient internal validity, one could suggest that the study should involve a delayed-intervention. Delayed-intervention benefits students as it ensures that the control group also receives an experience identical to that of the 'intervention group. In this case, at the end of the initial intervention, the same PBL method could be used with the control group, in order for the students to have experience of an expected beneficial experience. Although this might be a suggestion to resolve the ethical issue of having one group (control) not gaining the benefits of a teaching approach like the other group did (intervention), it was not practical to implement this in the current study, as the intervention took around 14 weeks to implement, which coincides with the end of the particular module. In other words, a sequential study or delayed intervention could not have been implemented due to time restrictions (14 weeks is not enough to make sure both group have a chance to properly use PBL and TL approached in the same semester).

Moving on to further ethical issues, confidentiality and anonymity also was taken into consideration, before, during and after the study. Referring to the differences between confidentiality and anonymity, Berg (2007) explains that confidentiality refers to elimination of any element that might indicate the identity of any participants while anonymity means covering participants' names. De Vaus (2002) outlined three reasons for the importance of confidentiality:

- To improve the quality and honesty of responses, especially on sensitive issues,

- To encourage participation in the study and thus to improve the representativeness of the sample,

- To protect a person's privacy

(p. 62).

In order to ensure anonymity in this study, code numbers were used. All the participants were guaranteed anonymity. The list of Matriculation numbers and associated names was kept separate from the actual data. Only one lecturer took part in the study. The lecturer roles were strictly limited to his/her participation in the study on teaching and learning process only. The involved lecturer was observed working in teaching and learning process of PEA3063 module and was interviewed about his/her PBL experiences.

All data were collected and stored in accordance with ethical requirements. Similarly, all AAT instruments were administered by the lecturer involved. The AAT was developed by the subject lecturer with help from experts in Population Economics and Policy. The lecturer was given instruction and guidance on how to administer and manage the research instruments. The lecturer also followed the guidelines from the Academic Division, UPSI when developing and administering the AAT (e.g. computer password to protect unauthorized person to access the confidential record, and using secure room to store question papers and answer scripts). The PEA3063 – Population Economics and Policy test (AAT) sheets were marked by the involved lecturer according to the scheme of marking issued by the Academic Division of UPSI, based on scheme by the University's Question Makers.

However, the PBL Self-Assessment Questionnaires, Student Background Questionnaires, Lecturer's Questionnaire and CCTST were all administered by the researcher himself. In order to use the CCTST as a research instrument, the researcher contacted the copyright holder, Insight Assessment Inc to acquire the

necessary permission [see Appendix L], and had to comply with their terms and conditions on using this instrument. Insight Assessment Inc approved the application submitted by the researcher. The CCTST for pre-, mid-intervention and post-tests were marked by the copyright holder, Insight Assessment Inc. at the end of the intervention (CAPSCORE).

The data obtained from the participants were used only for the purposes of this study. All findings were reported as group results, to be included in the dissertation and submitted for publication. Participants were made aware of how data would be used and findings would be published at the initial stage of obtaining informed consent.

4.10   Participants

Researchers should provide enough information about participants so that the readers can identify the population of participants to which results may be generated (Gersten et al., 2005). As part of describing participants, group differences on salient variables are also presented.

According to Creswell (2009), readers need to know about the selection, assignment, and number of participants taking part in the experiment. Creswell (2009) emphasises a number of issues, as discussed below:

a)   Describe the selection process for participants as either random or non-random (conveniently selected). The participants might be selected by random selection or random sampling. Based on Keppel (1991), with random sampling each individual has an equal probability of being selected from the population, In quasi-experiment procedures, this will happen when individuals are not randomly assigned; the random allocation of participants to the PBL and TL groups helps to maximise the probability that they do not differ in any systematic way.

b)   Identify other features in the experimental design that will systematically control the variables that might influence the outcome. Creswell (2009)

suggested that the approach is matching participants – in terms of a certain trait or characteristic and then assigning one individual from each matched set to each group. Another procedures is using covariates (e.g., pre-test scores) as moderating variables and controlling for their effects statistically, selecting homogeneous samples, or blocking the participants into subgroups or categories and analyzing the impact of each sub-group on the outcome (Creswell, 2008);

c) Tell the reader about the number of participants in each group and the systematic procedures for determining the size of each group. Based on Gersten et al. (2005), appropriate procedures are used to increase the probability that participants were comparable across condition. According to Lipsey (1990), investigators use a power analysis to identify the appropriate sample size for groups. This calculation involves;

- a consideration of the level of statistical significance for the experiment, or alpha;

- the amount of power desired in study – typically presented as high, medium, or low - for the statistical test of the null hypothesis with sample data when the null hypothesis is, in fact, false and;

- the effect size, the expected differences in the mean between the control and experimental groups expressed in standard deviation units; and

d) Researchers set values for these three factors (e.g., alpha = .05, power = .80, and effect size = .05) and according to Cohen (1977) and Lipsey (1990), it can look up in a table the size needed for each group. In this way, the experiment is planned so that the size of each treatment group provides the greatest sensitivity that the effect on the outcome actually is due to the experimental manipulation in study (Creswell, 2009).

According to Burns (2000), a population is clearly stated as a set that contains all cases which meet the specific criteria. Additionally, a population includes an entire group of people or objects or events which all have at least one characteristic in

common, and must be defined specifically and unambiguously. However ambiguity itself is a problematic feature of many study populations (e.g., all university lecturers could be a population), the characteristics are clearly defined although lecturers in traditional and new universities may have different characteristics and could individually form populations.

The research population consisted of a convenience sample of 45 students of the FPE, UPSI, Malaysia who are undergoing the Bachelor Degree of Education (Economics). This particular sample was chosen because the researcher must use a naturally formed group (e.g., classroom). The sample comprised a group of final semester students who were registering for the PEA3063 – Population Economics and Policy in Semester 1, 2010/2011 Session (July-October 2010). Students in each group were divided into two different lecture groups but with the same lecturer. The students were equally and randomly assigned to either an experimental group (n = 23) or a control group (n = 22), by the Academic Division of UPSI, based on the list of registered students for this course for the particular academic year. Both groups contained the same type of student achievement level as reflected by the Cumulative Grade Point Average (CGPA) such as; higher achiever (CGPA between 3.50-4.00), middle-higher achiever (CGPA between 3.00-3.49), middle-lower achiever (CGPA between 2.50-2.99) and lower achiever (CGPA between 2.00-2.49).

4.10.1 Gender

A total of 45 students participated in the study. These were randomly assigned and divided into experimental and control groups by the Academic Division when they were register to take courses forPEA3063 – Population Economics and Policy. As shown in Table 7 below, 23 students (5 males and 18 females) formed the PBL group while the Traditional group consisted of 22 students (13 males and 9 females).

Table 7:
Participants' Gender by intervention group (frequency counts)

Gender	PBL	Traditional	Total
Male	5	13	18
Female	18	9	27
Total	23	22	45

A chi-square test was conducted on these data, which compares the expected and observed values for gender in the PBL and TL groups. In this case, the Chi-square test for independence (with Yates Continuity Correction) indicated significant differences between gender and groups ($x^2 = 6.54$, df = 1, p = .011). While 13 male students were placed in the TL group compared with 5 male students in the PBL group. For the female students, there were 18 of them in the PBL group compared with 9 in TL group.

In order to explore the differences in CT between the PBL and TL groups prior to participating in the study, an independent-samples t test were conducted. The intention was to see whether or not there were any differences between the two groups based on gender on CT as assessed by the CCTST tool.

Table 8:
Report of Participants' Gender CT skills on pre-test

Pre-CT skill	Male (n = 18) Mean (SD)	Female (n = 27) Mean (SD)	Mean difference	t-value (df)	Sig. (2 tailed)	Sig. or Not Sig. (n.s)
Pre-Inductive	3.67 (1.53)	3.59 (1.65)	.074	0.152 (43)	0.880	n.s
Pre-Deductive	4.17 (2.31)	3.56 (1.37)	.611	1.011 (43)	0.322	n.s
Pre-Analysis	1.78 (1.22)	1.74 (1.13)	.037	0.105 (43)	0.917	n.s
Pre-Inference	3.72 (2.16)	2.78 (1.74)	.944	1.618 (43)	0.113	n.s
Pre-Evaluation	2.33 (1.28)	2.63 (1.28)	-.296	-0.762 (43)	0.450	n.s
Pre-Total	7.83 (3.20)	7.15 (2.43)	.685	0.815 (43)	0.419	n.s

A detailed analysis for the five sub-scales based on CT skills, CCTST show there was no significant differences at pre-test between the two groups of gender, and it was showed in Table 8 above. There was no significant difference in groups based on gender at pre-Inductive scores for male (M=3.67, SD=1.53) and female (M=3.59, SD=1.65), [t = 0.152, df = 43, p = 0.88 (two-tailed)]. As expected, the magnitude of the differences in the means (mean difference = .074) was related to small effect (eta squared = 0.05).

Similar results were found for the other CCTST sub-scales (Deductive, Analysis, Inference and Evaluation) for the pre-test scores. There was no significant difference in any of the other constructs or the pre-Total as measured by CCTST between the male and female.

4.10.2 Pre-Entry level CGPA (previous semester)

A brief survey was distributed to students one week before the intervention to obtain information on their demographic background. The descriptive statistics are presented for the PBL students and TL students. The CGPA scores at the beginning of the study (before any intervention took place) are shown in Table 9 below.

Table 9:
 Participants' CGPA between Groups (Group Mean from previous semester)

CGPA*	PBL (%)	Traditional (%)
3.5 and above	6 (26.1)	2 (9.1)
3.00 – 3.49	11 (47.8)	15 (68.2)
2.50 – 2.99	6 (26.1)	4 (18.2)
2.49 and below	0 (0)	1 (4.5)
Mean (SD)	2.00 (0.739)	2.18 (0.665)

Note:
3.70 and above =First Class; 3.00-3.69=Second upper class; 2.50-2.99=Second lower class; 2.00-2.49=Pass; 1.99 or lower=Fail

The mean CGPA for the PBL group was 2.00 (SD = 0.739) while for the TL group it was 2.18 (SD = 0.665). A t test was conducted and showed no significant difference in the CGPA scores between the PBL and traditional groups. The data suggests that the groups were similar at the beginning of the study in terms of their previous CGPA scores. In connection with this, each group consist of variant academic achievement (CGPA), as shown on Table 9 above.

A total of 45 students participated in the study (see Table 7 above). From this number, 23 students' (5 males and 18 females) were selected into the PBL group and 22 students' (13 males and 9 females) were placed in the traditional group. The current CGPA scores before the intervention for selected participants are shown in (see Table 8 above), where the mean for PBL group was (M = 2.00, SD = 0.739) and traditional group (M = 2.18, SD = 0.665).

The lecturer for the experimental and control group in this study is a permanent lecturer and has a qualification in PhD in Economics. He has at least 5 years of experience in teaching at University level.

The selected lecture group of students involved in this study used the same lectures and seminar rooms. The same lecturer acted as overall facilitator for the module for the whole semester (14 weeks) of the study. This allowed for the control of lecturer or facilitator effects. They used the same facilities to make sure the research findings would not be affected by other probable factors.

4.11   The Learning Environment for the Research Study

The research was conducted in UPSI. The university faculty of study involved was the FPE. The faculty is located in the main campus of UPSI in Tanjong Malim district, Perak about 90 kilometres (56 miles) from the capital city of Kuala Lumpur, Malaysia.

UPSI was the first teaching university in Malaysia and formerly known as the Sultan Idris Training College (SITC). The college was originally established to train the

teachers for Malay schools. SITC later became the Malay Intellectual Life Centre with students from all over the peninsula and Borneo. On February 21, 1987, Sultan Idris Training College was upgraded to Sultan Idris Institute of Education (IPSI). Its position as a premier institute of education provided it with a higher status than other colleges, and it was also given the power to implement the Advanced Certificate and Postgraduate Diploma in Education.

In accordance with its role and significance in history, the government had been driven to upgrade the institute's status to a much higher level as UPSI on May 1, 1997. The purpose was to fulfil the university's intention in providing opportunities for the public especially in producing competent teachers who are able to face challenges in the new millennium. This is consistent with the government's wish of developing and improving human resource who are knowledgeable, competent and honourable in character in the fields of science, technology, language, art, literature and culture with particular emphasis of educational elements. From a total of 338 students in 1997, the current situation (2011), points towards an enrolment of more than 17,000 students. This does not include a number of about 1,000 students in the Diploma Pendidikan Lepasan Ijazah (DPLI) (known in English as Postgraduate Teaching Diploma) which is a preparatory programme for secondary school teachers, Polytechnic and Matriculation lecturers, 3,500 teachers for the Program Pensiswazahan Guru-Guru Sekolah Rendah (known in English as Primary School Graduate Teacher's Programme) – a special programme under supervision and accreditation from Ministry of Education (MOE) and 1,500 postgraduate students . UPSI also has more than 1,000 students who are registered for the Diploma in the Pre-School programme under the cooperation with the Jabatan Kemajuan Masyarakat (KEMAS) (known in English as Department of Community Development), Ministry of Rural and Regional Development, Malaysia.

Before the researcher proceeded with the intervention and data collection, the research proposal submitted in the Doctor of Education (Ed. D) module – PR958 Synoptic Paper was reviewed by the HASS, School of Education Research Ethics Committee, University of Strathclyde, and later approved [see Appendix I]. A key ethical issue was to ensure that neither the PBL nor the traditional group would be disadvantaged by the intervention.

4.12   Summary for Methodology

The study used the quasi-experimental design based on the pre-test non-equivalent group and the post-test 'mixed between-within subject repeated measures design'. Between-subjects-factors were whether the teaching method was PBL or Traditional teaching. While the 'within subjects or repeated measures factor' is the performance at pre-, mid-intervention or Post-test for each dependent variable (i.e., CT skills and PEA3063 – Population Economics and Policy Achievement Test).

This study was conducted on a student population in the FPE, UPSI of 14 weeks (one full semester) in Semester1, 2010/2011 Session. A total of 45 final semester students were registered and involved in this study. The experimental and control groups were determined by the Academic Division of UPSI based on the registration done by the students for the PEA3063 course. The experimental group used the PBL approach based on the teaching syllabus, while the control group still retained the traditional instruction methods.

CHAPTER 5

RESEARCH FINDINGS

5.1   Overview

This section presents the research findings for data collected at the FPE, UPSI. Two educational methods were implemented to assess the effect of PBL on students' CT skill. The data were analyzed using SPSS 18.0 software. The descriptive statistics are presented in the following sections followed by the analysis carried out for each of the research questions. The section comprises several parts and answers the four research questions:

Research Question 1:
Does PBL influence students' CT skill?

CT skills were examined using CCTST to explore differences between the beginning of the semester (pre-test), mid-semester (mid-intervention test) and at the conclusion of the semester (post-test). The independent sample t test and mixed ANOVA was applied to determine whether there was a significance difference between the PBL and TL groups in their CT skill as measured by the CCTST.

Research Question 2:
Does PBL influence students' academic achievement on Business Education?

Students' academic achievement were examined using PEA3063 – Population Economic and Policy - Achievement Test (AAT) to explore differences between the beginning of the semester (pre-test), mid-semester (mid-intervention test) and at the conclusion of the semester (post-test). An independent-sample t test and one-way between groups analysis of covariance (ANCOVA) was applied to determine whether there was a significance difference between the PBL and TL groups in their CT skill as measured by the AAT.

Research Question 3:

Does a relationship exist between the students' CT skills and their academic achievement?

Spearman's rho correlation was applied to determine whether there was a relationship between independent variables (PBL and TL) and dependant variables (CT skills and academic achievement).

Research Question 4:

Can the students' CT skill be used to predict the students' achievement on the Business Education subject?

In order to explore the effect of PBL on content acquisition and economics skill, written exam scores were evaluated. The regression analysis of dependent variables was conducted to see the percentage of contribution of student's CT skills to the academic achievement, and hence the possibility of student's CT skills could be as a predictor of academic achievement.

Research Question 5:

What are Business Education students' perceptions about the PBL implementation?

Finally, the findings from the analysis on the self-reported data (from 'open-ended' Data of Students Questionnaire) regarding student perceptions of PBL that were collected via paper and pencil questionnaires are presented in this chapter.

5.2   The Effects of PBL on Malaysian Students' CT

The hypothesis related to Research Question 1 for this dissertation is concerned with the effects of PBL on students' CT skill. Specifically it sought to ascertain if the intervention described in Section 4.6 (Research Implementation) led to improvements in students' CT skill as measured by the CCTST. In order to explore differences between the PBL and TL groups at baseline (to establish whether the two groups differed prior to participating in the study), mid-intervention and end of intervention (to assess the effects of the intervention), a series of independent samples t test and mixed ANOVA were conducted. The intention was to see whether or not there were any differences between the two groups on all constructs of CT as assessed by the CCTST tool. Results are presented in Table 10 below.

Table 10:
Means Scores of CCTST Constructs (Pre-test, Mid-intervention test and Post-test)

CCTST Construct	Test	PBL (n = 23) Mean (SD)	TL (n = 22) Mean (SD)	Total Mean (SD)	Sig. (2 tailed)	Sig. or Not Sig. (n.s)
Inductive	Pre	3.30 (1.69)	3.95 (1.43)	3.62 (1.57)	0.172	n.s
	Mid	3.43 (1.78)	3.73 (1.24)	3.58 (1.53)	-0.292	n.s
	Post	6.87 (1.79)	4.73 (1.64)	5.82 (2.02)	0.001	Sig
	Total Mean (SD)	4.53 (1.75)	4.14 (1.44)			
Deductive	Pre	3.83 (1.67)	3.77 (1.97)	3.80 (1.80)	0.922	n.s
	Mid	3.91 (1.70)	3.50 (1.60)	3.71 (1.65)	0.413	n.s
	Post	5.13 (1.79)	5.59 (1.84)	5.36 (1.81)	0.400	n.s
	Total Mean (SD)	4.29 (1.72)	4.29 (1.80)			
Analysis	Pre	1.83 (1.03)	1.68 (1.29)	1.76 (1.15)	0.679	n.s
	Mid	1.74 (1.25)	1.41 (0.96)	1.58 (1.12)	0.382	n.s
	Post	3.74 (1.05)	2.59 (0.73)	3.18 (1.07)	0.001	Sig.
	Total Mean (SD)	2.34 (1.11)	1.89 (0.99)			
Inference	Pre	2.96 (2.16)	3.36 (1.73)	3.16 (1.95)	0.491	n.s
	Mid	2.91 (1.51)	3.14 (1.91)	3.02 (1.70)	0.664	n.s
	Post	5.17 (2.17)	4.68 (1.46)	4.93 (1.85)	0.553	n.s
	Total Mean (SD)	3.68 (1.95)	3.73 (1.76)			
Evaluation	Pre	2.35 (1.40)	2.68 (1.13)	2.51 (1.27)	-0.334	n.s
	Mid	2.70 (1.40)	2.68 (1.17)	2.69 (1.28)	0.971	n.s
	Post	3.09 (1.13)	3.05 (0.84)	3.07 (0.99)	0.297	n.s
	Total Mean (SD)	2.71 (1.31)	2.80 (1.87)			
Overall CCTST	Pre	7.13 (2.79)	7.73 (2.75)	7.42 (2.75)	0.473	n.s
	Mid	7.35 (2.84)	7.23 (1.97)	7.29 (2.43)	0.870	n.s
	Post	12.00 (2.89)	10.32 (1.59)	11.18 (2.47)	0.021	Sig
	Total Mean (SD)	8.83 (2.8	8.43 (2.10)			

To explore whether there was any change in the CCTST constructs from pre-test to mid-intervention test and post-test, a mixed ANOVA was conducted as shown in Section 5.3.

5.3 Participants' Individual CCTST Constructs Scores Differences across Three Time Periods

A mixed ANOVA was conducted to assess the impact of two teaching and learning method (PBL, TL) on participants' individual CCTST constructs scores differences across three time periods (baseline, mid- intervention and end of intervention). This analysis can be used to test whether there are main effects for each of the independent variables and whether the interaction between the two variables is significant, as shown on Table 10 (t test report of CCTST Constructs) above. The details of the ANOVA analysis are presented below by each CCTST construct (Figure 1, 2, 3, 4, and 5 below).

5.3.1 Inductive Subscale
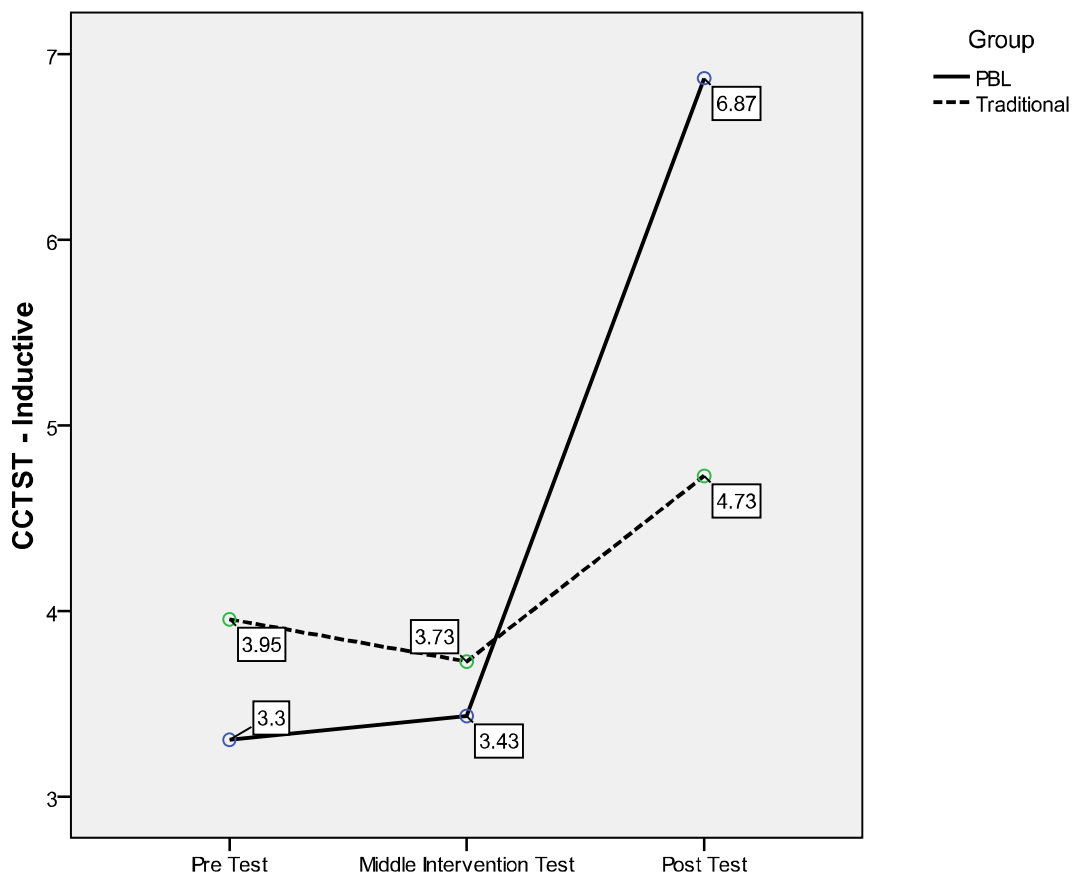
Figure 1:
CCTST –Inductive means scores between PBL and TL at Pre-test, Mid-intervention test and Post-test

As shown in Figure 1 above, a mixed ANOVA was conducted to explore the impact of the independent variables on CCTST-Inductive construct. There was significant interaction between the teaching approach (PBL and TL) and the time periods [Wilk's Lambda (.67), F (2, 42) = 10.28, p < 0.001, partial eta squared = .33. Furthermore it would seem that it is the PBL group following the present intervention which had the highest CCTST-Inductive score. There was a substantial main effect for time [Wilk's Lambda (.42), F (2, 42) = 29.48, p < .005, partial eta squared = .58] with PBL and TL group having different patterns of scores across the three time periods. At the base line test, the TL group (M = 3.95, SD = 1.43) had a slightly higher score on CCTST – Inductive subscale than the PBL (M = 3.30, SD = 1.69). However, at mid-intervention test, PBL showed an improvement (M = 3.43, SD = 1.78), but the TL group showed a reduction (M = 3.73, SD = 1.24). At post-test, both groups showed an improvement on CCTST – Inductive subscale, with PBL group significantly higher (M = 6.87, SD = 1.79) compared to TL group (M = 4.73, SD = 1.64). Table 10 shows the PBL and TL scores across three time points. The mean score for PBL at pre-test (M = 3.30, SD = 1.69) was slightly lower from the mid-intervention test (M = 3.43, SD = 1.78). The mean score of PBL (M = 6.87, SD = 1.79) was significantly higher than that of TL (M = 4.73, SD = 1.64) at post-test. The main effect for group was not significant [F (1, 43) = 1.98, p = .17 and eta squared = .044].

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5.3.2 Deductive Subscale
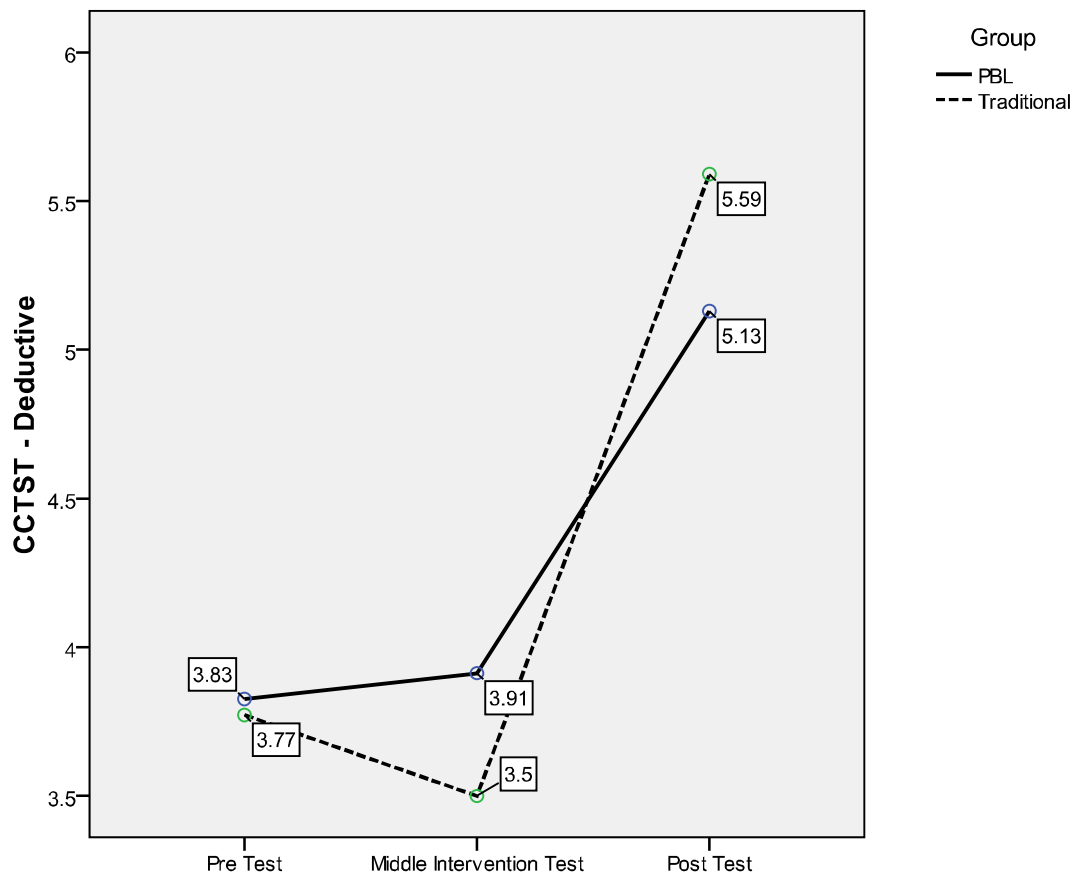
Figure 2:
CCTST –Deductive means scores between PBL and TL at Pre-test, Mid-intervention
test and Post-test

As shown in Figure 2 above, a mixed ANOVA was conducted to explore the impact
of the independent variables on CCTST-Deductive construct. There was no
significant interaction between the teaching approach (PBL and TL) and the time
periods, [Wilk's Lambda (.97), $F_{(2, 42)}$ = .68, $p < 0.005$, partial eta squared = .031].
There was a substantial main effect for time [Wilk's Lambda (.66), $F_{(2, 42)}$ = 10.69,
$p < .001$, partial eta squared = .34] with PBL and TL group having different pattern of
score in CCTST – Deductive subscale across the three time period. Table 10 which
show the Post-hoc comparisons at base line indicates that the PBL group (M = 3.83,
SD = 1.67) scored slightly higher (not statistically significant difference) on CCTST –
Deductive subscale than the TL group (M = 3.77, SD = 1.97). At mid-intervention,
PBL showed a slightly improvement (not statistically significant difference)

(M = 3.91, SD = 1.70), while the TL group showed a small reduction (not statistically significant difference) (M = 3.50, SD = 1.60). At post-test, both groups showed a significant improvement on CCTST – Deductive subscale, with the TL group scoring higher (M = 5.59, SD = 1.84) compared to the PBL group (M = 5.13, SD = 1.79). The main effect for groups (PBL vs. TL) was not significant [F (1, 43) = 0.001, p = .99], suggesting no difference in the effectiveness of the two teaching approach towards CCTST – Deductive subscale.

5.3.3 Analysis Subscale
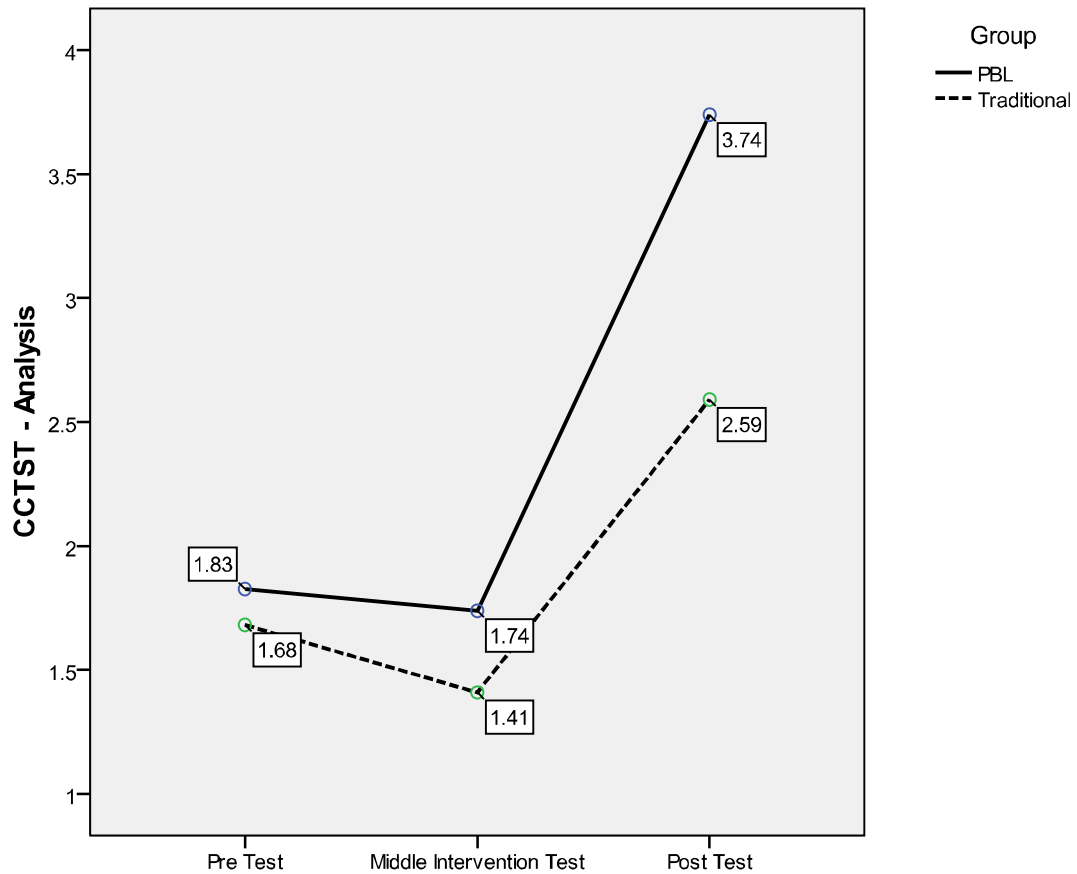
Figure 3:
CCTST –Analysis means scores between PBL and TL at Pre-test, Mid-intervention test and Post-test

As shown on Figure 3 above, a mixed ANOVA was conducted to explore the impact of the independent variables on CCTST-Analysis construct. There was no significant interaction between the teaching approach (PBL and TL) and the time periods, [Wilk's Lambda (.87), F (2, 42) = 3.05, p < 0.005, partial eta squared = .127]. There was a main effect for time, [Wilk's Lambda (.38), F (2, 42) = 34.09, p < .001, partial eta squared = .62] with PBL and TL group have different pattern of score in CCTST – Analysis subscale across the three time period. At the base line test, PBL group (M = 1.83, SD = 1.03), had a slightly higher (not statistically significant difference) score on CCTST – Analysis subscale than in TL group (M = 1.68, SD = 1.29). However, at mid-intervention test, both groups showed a slight reduction (not

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statistically significant difference) in CCTST – Analysis subscale score respectively to (M = 1.74, SD = 1.25) and (M = 1.41, SD = 0.96). At post-test, both groups showed an improvement on CCTST – Analysis subscale score, with PBL group (M = 3.74, SD = 1.05) scoring substantially higher compared to the TL group (M = 2.59, SD = 1.05). Post-hoc comparisons indicated that the mean score for the PBL group at pre-test (M = 1.83, SD = 1.03) was slightly higher (not statistically significant difference) compared to the mid-intervention test (M = 1.74, SD = 1.25). The PBL group's mean score (M = 3.74, SD = 1.05) was significantly higher than that of the TL group (M = 2.59, SD = 1.05) at post-test. The main effect for groups (PBL, TL) was significant [F (1, 43) = 0.003, p<.005, eta squared = .188], suggesting differences in the effectiveness of the two teaching approach towards CCTST – Analysis subscale.

5.3.4   Inference Subscale
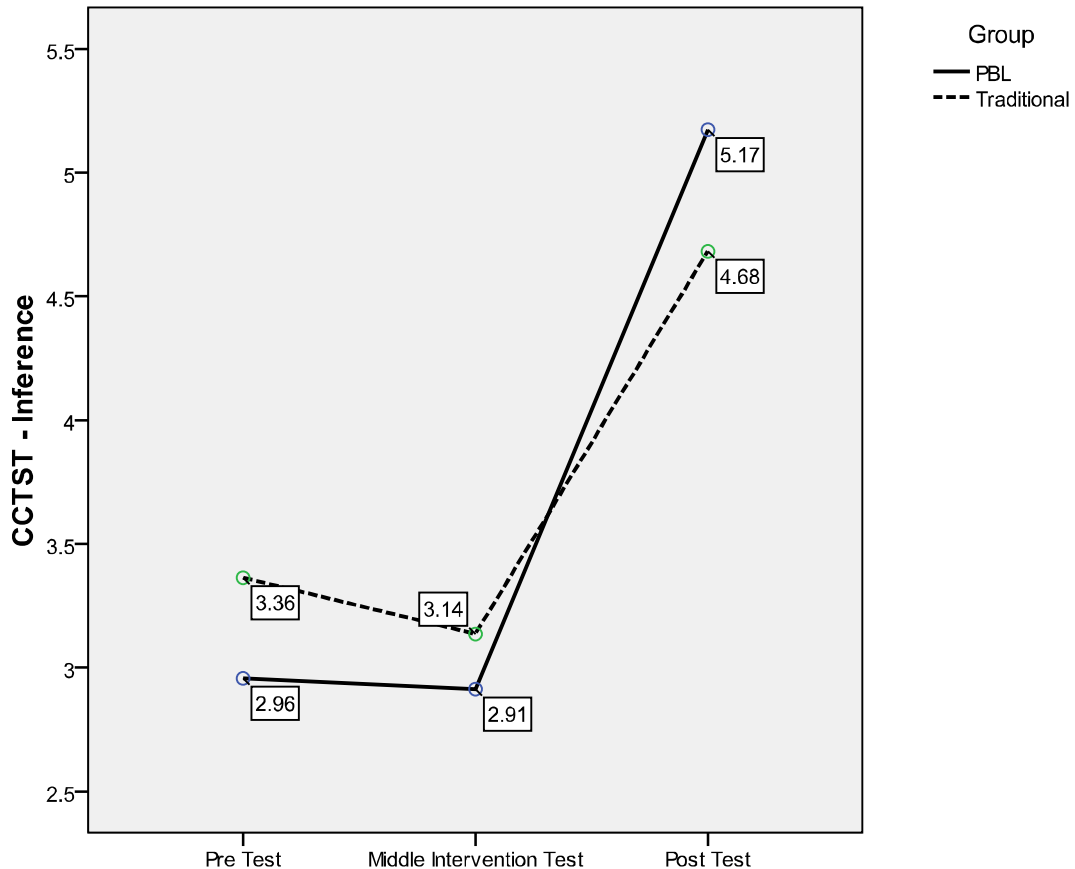
Figure 4:
CCTST –Inference means scores between PBL and TL at Pre-test, Mid-intervention test and Post-test

As shown in Figure 4 above, a mixed ANOVA was conducted to explore the impact of the independent variables on CCTST-Inference construct. There was a significant interaction between the teaching approach (PBL and TL) and the time periods [Wilk's Lambda (.97), F (2, 42) = .59, p < 0.005, partial eta squared = .027]. Furthermore it would seem that it is the PBL group following the present intervention which had the highest CCTST-Inference score at post-test, even though they scored lower than the TL group at pre-test. There was a main effect for time [Wilk's Lambda (.624), F (2, 42) = 12.66, p < .001, partial eta squared = .38] with PBL and TL group having different patterns of scores in CCTST – Inference subscale across the three time

period. At the base line test, TL (M = 3.36, SD = 1.73) scored slightly higher (not statistically significant difference) on this subscale than the PBL (M = 2.96, SD = 2.16). However, at mid-intervention, both groups showed a slight reduction (not statistically significant difference) [PBL's mean = 2.91, SD = 1.51) and TL's mean = 3.14, SD = 1.91)]. At post-test, both groups showed an improvement on CCTST – Inference subscale score, with the PBL group scoring significantly higher (M = 5.17, SD = 2.17) than the TL group (M = 4.68, SD = 1.46). The main effect comparing the two types of intervention (PBL, TL) was not significant [F (1, 43) = 0.88, p   .05 and eta squared = .001], suggesting no difference in the effectiveness of the two teaching approach towards CCTST – Inference subscale.

5.3.5   Evaluation Subscale
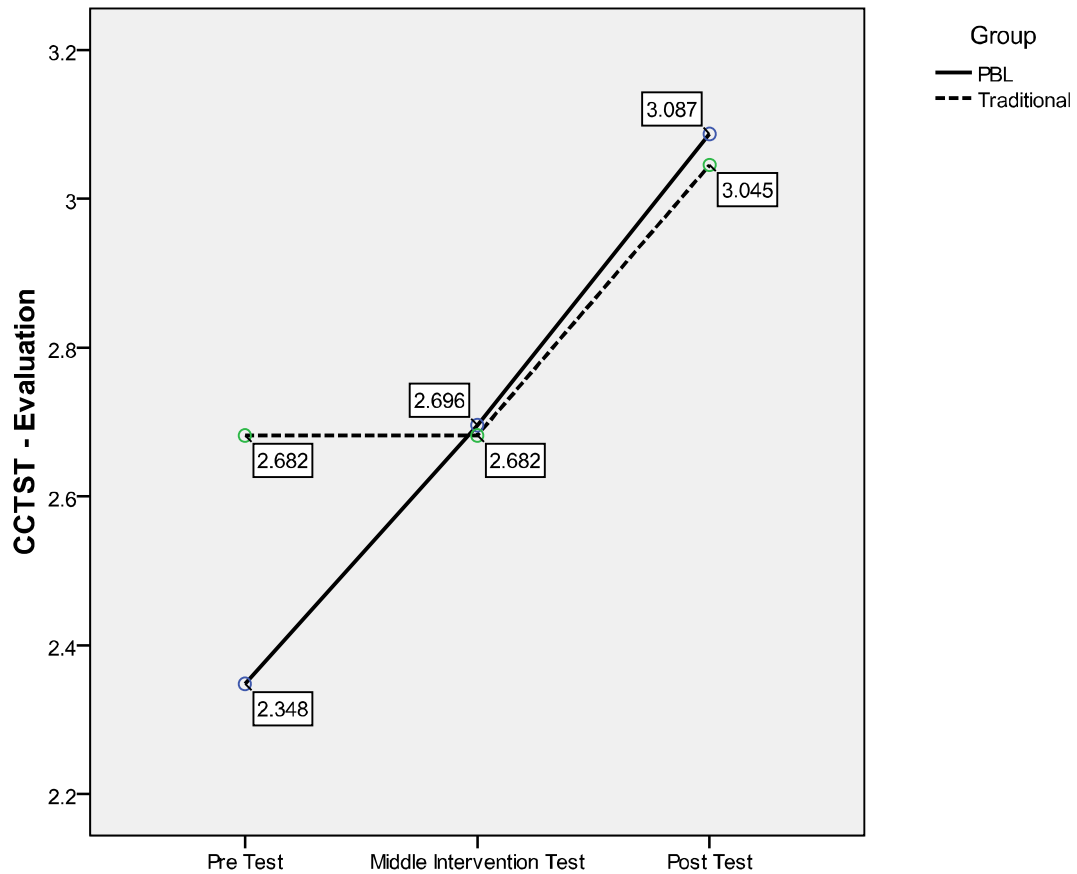
Figure 5:
CCTST –Evaluation means scores between PBL and TL at Pre-test, Mid-intervention test and Post-test

As shown in Figure 5 above, a mixed ANOVA was conducted to explore the impact of the independent variables on CCTST-Evaluation construct.   Mauchly's test indicated that the assumption of sphericity had been violated χ^2 (2) = 7.50, p< .05, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (ϵ = 0.86).   Results showed that there were statistically significant differences between the PBL and TL groups on CCTST – Evaluation scores [F (1.72, 73.91) = 2.28, p = .05].

5.3.6   Overall CCTST Subscales
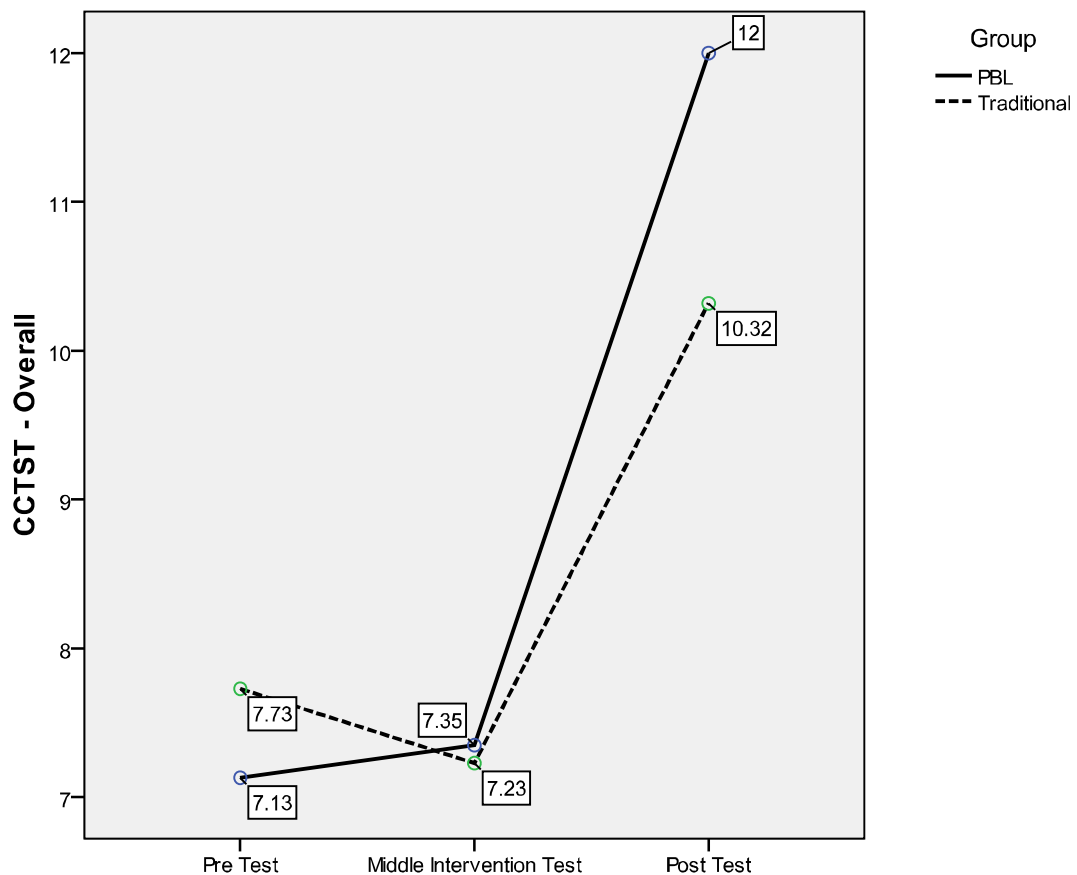
Figure 6:
CCTST –Overall means scores between PBL and TL at Pre-test, Mid-intervention test and Post-test

As shown in Figure 6 above, a mixed ANOVA was conducted to explore the impact of the independent variables on CCTST-Overall constructs.   There was significant interaction between the teaching approach (PBL and TL) and the time periods, [Wilk's Lambda (.90), $F_{(2, 42)} = 2.27$, $p < 0.001$, partial eta squared = .097]. Furthermore it would seem that it is the PBL group following the present intervention which had the highest CCTST-Overall score.   There was a main effect for time, [Wilk's Lambda (.36), $F_{(2, 42)} = 37.36$, $p < .001$, partial eta squared = .64] with PBL and TL group having different patterns of scores in Overall CCTST across the three time period.   At the base line test, TL (M = 7.73, SD = 2.75) had a slightly higher (not statistically significant difference) score on CCTST-Overall subscales score than in

PBL (M = 7.13, SD = 2.79). However, at mid-intervention test, PBL show a slight improvement (not statistically significant difference) (M = 7.35, SD = 2.84), but TL group showing a reduction on CCTST-Overall subscales score (M = 7.23, SD = 1.97). At post-test, both groups showed an improvement on CCTST-Overall subscales score, with the PBL group scoring higherat levels that reached statistical significant (M = 12.00, SD = 1.59) compared to the TL group (M = 10.32, SD = 1.59). Post-hoc comparisons indicates that the differences between PBL and TL, with mean score of PBL at pre-test (M = 7.13, SD = 2.79) was slightly lower (not statistically significant difference) from the mid-intervention test (M = 7.35, SD = 2.84). The mean score of PBL 12.00, SD = 1.59) was significantly higher than that of TL (M = 10.32, SD = 1.59) at post-test. The main effect comparing the two types of intervention (PBL and TL) was not significant [F (1, 43) = .834, p = .37 and eta squared = .019], suggesting no difference in the effectiveness of the two teaching approach towards CCTST-Overall subscales.

5.3.7   A Comparison of CCTST between Students in PBL and TL groups (Pre-
        test, Mid-intervention test and Post-test)

An independent samples t test was conducted to compare all constructs of CT skills as measured by CCTST between students' in PBL group and the TL group at the beginning of the semester (pre-test), mid-semester (mid-intervention test) and at the end of semester (post-test). As shown in Table 11 below, there was no significant difference in CT skills at pre-test scores for PBL group (Total CT M=7.13, SD=2.79) and TL group (Total CT M=7.73, SD=2.75), [t = -0.724, df= 43, p=-0.592 (two-tailed)]. As expected, the magnitude of the differences in the means (mean difference = -.597) was related to small effect (eta squared = .001).

Table 11:
Report of Students' CT skills on pre-test

CT skill	PBL (n = 23) Mean (SD)	TL (n = 22) Mean (SD)	Mean difference	t-value (df)	Sig. (2 tailed)	Significance
Inductive	3.30 (1.69)	3.95 (1.43)	-0.65	-1.39 (43)	0.172	n.s
Deductive	3.83 (1.67)	3.77 (1.97)	0.053	0.098 (43)	0.922	n.s
Analysis	1.83 (1.03)	1.68 (1.29)	0.144	0.416 (43)	0.679	n.s
Inference	2.96 (2.16)	3.36 (1.73)	-0.407	-0.695 (43)	0.491	n.s
Evaluation	2.35 (1.40)	2.68 (1.13)	-0.334	-0.878 (43)	0.385	n.s
Total	7.13 (2.79)	7.73 (2.75)	-0.597	-0.724 (43)	0.473	n.s

Similar results were found for the mid-intervention test scores. As shown in Table 12 below, there was no significant difference in any of the CT constructs or the Total CT as measured by CCTST between the PBL and TL groups.

Table 12:
Report of Students' CT skills on mid-intervention test

CT skill	PBL (n = 23) Mean (SD)	TL (n = 22) Mean (SD)	Mean difference	t-value (df)	Sig. (2 tailed)	Significance
Inductive	3.43 (1.78)	3.73 (1.24)	-0.292	-0.635 (43)	0.528	n.s
Deductive	3.91 (1.70)	3.50 (1.60)	0.413	0.838 (43)	0.406	n.s
Analysis	1.74 (1.25)	1.41 (0.96)	0.330	0.990 (43)	0.328	n.s
Inference	2.91 (1.51)	3.14 (1.91)	-0.223	-0.437 (43)	0.664	n.s
Evaluation	2.70 (1.40)	2.68 (1.17)	0.014	0.036 (43)	0.971	n.s
Total	7.35 (2.84)	7.23 (1.97)	0.121	0.165 (43)	0.870	n.s

Significant differences in some constructs of CT skills were found between the two groups in the post-test (see Table 13 below) with the PBL students' showing significantly higher scores on the overall CCTST scores (M=12.00, SD=2.89) compared to the TL group (M=10.32, SD=1.59), [t = 2.403, df = 43, p = 0.700 (two-tailed)]. A detailed analysis for the five sub-scales based on CT skills, CCTST show that a difference at post-test between the two groups exists in relation to Inductive and Analysis constructs, but not the rest.

Table 13:
Report of Students' CT skills on Post-test

CT skill	PBL (n = 23) Mean (SD)	TL (n = 22) Mean (SD)	Mean difference	t-value (df)	Sig. (2 tailed)	Significance
Inductive	6.87 (1.79)	4.73 (1.64)	2.142	4.180 (43)	0.001	Sig
Deductive	5.13 (1.79)	5.59 (1.84)	-0.462	-0.850 (43)	0.400	n.s
Analysis	3.74 (1.05)	2.59 (0.73)	1.148	4.223 (43)	0.001	Sig
Inference	5.17 (2.17)	4.68 (1.46)	0.492	0.889 (43)	0.379	n.s
Evaluation	3.09 (1.13)	3.05 (0.84)	0.042	0.140 (43)	0.890	n.s
Total	12.00 (2.89)	10.32 (1.59)	1.682	2.403 (43)	0.021	Sig

5.4 PBL and Students' Academic Achievement

The hypothesis related to Research Question 2 for this dissertation also concerned the effects of PBL on students' academic achievement. Specifically it sought to ascertain if the intervention describes in Section 4.6 (Research Implementation) was associated to improvements in students' academic achievement as measured by an instrument, the AATs. An independent sample t test was conducted to compare the two groups' academic achievement at pre-test, mid-intervention test and post-test.

Table 14:
Students' academic achievement (mean and SD) at pre-test, mid-intervention test and post-test

AAT*	PBL (n = 23) Mean (SD)	TL (n = 22) Mean (SD)	Mean difference	t-value (df)	Sig. (2 tailed)	Significance
Pre-test	74.65 (2.17)	74.40 (5.94)	0.243	0.184 (43)	0.855	n.s
Mid-Intervention	74.30 (4.17)	68.50 (3.34)	5.804	5.133 (43)	0.001	Sig.
Post-test	78.97 (5.80)	71.05 (3.11)	7.91	5.66 (43)	0.001	Sig.

Note:
Each type of AAT is different in term of contents, difficulties index, weighted average and therefore scores on the tests conducted at the different time points are not directly comparable.

As shown in Table 14 above, there was no significant difference between the PBL and the TL groups regarding the students' AAT at pre-test. Whereas, significant differences in academic achievement were found between two groups at mid-intervention test and post-test. The PBL students' scored significantly higher in the mid-intervention test (M=74.30, SD=4.17) compared to TL group (M=68.50, SD=3.34). Similarly, in the post-test to (M=78.97, SD=5.80) compared to (M=71.05, SD=3.11), [t = 5.66, df= 43, p = 0.001 (two-tailed)].

These results conclude that, while at baseline (before intervention) no difference exist between the two groups, at mid-intervention and final intervention the PBL method is

associated with significantly higher Achievement scores, therefore, better students' academic achievement.

To support the results presented in the previous section, further analysis was conducted. It was decided to conduct a series of ANCOVA tests, where pre-AAT was used as a covariate when looking at differences between the PBL and TL groups in mid- and post-AAT.

The pre-AAT test was not directly comparable to the mid- and post-AAT tests. As explained in section 4.3.2 of the Methodology, it was assessing what had been learned in the previous year, including questions that covered the principles of Economics such as Micro- and Macro-Economics. This was important to include, in order to a measure of their previous understanding and knowledge of basic Economics. The mid- and post-AAT tests though included questions assessing the subject topic and content for the current year. It was decided, therefore, to conduct a series of ANCOVA tests, where prior knowledge and understanding (pre-AAT) was included and controlled for (as one of the covariates) while focusing on the mid- and post-intervention differences.

A one-way between groups analysis of covariance (ANCOVA) was conducted to compare the effectiveness of two different groups of interventions on their academic achievement at mid-intervention test and post-test. The scores in the pre-test were treated as a covariate. The use of well-chosen pre-test covariates can help the researcher reduce the confounding influence of group differences.

The independent variable was the type of intervention or intervention group (PBL and TL). The dependent variable consisted of scores on the mid- and post-intervention tests on AAT, with the respective AAT pre-test used as the covariate in this analysis.

Before the analysis was conducted, preliminary checks were completed to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances,, and reliable measurement of the covariate. Analysis from Levene's test showed a Sig. value of .21, which is much larger than the cut-off value of .05.

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After adjusting for prior-test scores, there were significant differences between the two groups (PBL and TL) on mid-intervention AAT test ($F_{(1, 43)} = 30.93$, p = .001, partial eta square = .424.). Looking at the means and SD for mid ATT from this analysis, PBL (74.3, SD= 4.17) scored slightly higher than the TL group (M= 68.5, SD= 3.35), even after controlling for pre-AAT.

Similarly, after adjusting for prior-test AAT scores, there were significant differences in AAT between the PBL and TL groups) on post-test scores ($F_{(1, 43)} = 43.73$, p = .001, partial eta square = .51). Looking at the means and SD for post-ATT from this analysis, PBL (79, SD= 5.8) scored slightly higher than the TL group (M= 71.1, SD= 3.1), even after controlling for pre-AAT.

A similar and final analysis was conducted using mid-AAT as the covariate this time and post-AAT as the dependent variable. This final set of analysis of covariance showed that, even after adjusting for mid-intervention test scores, there were significant differences between the two group in post-test ATT scores($F_{(1, 43)} = 4.99$, p = .033, partial eta square = .104). Looking at the means and SD for post-ATT from this analysis, PBL (79, SD= 5.8) scored slightly higher than the TL group (M= 71.1, SD= 3.1), even after controlling for mid-AAT.

These results show that even after controlling for any potential differences in academic achievement before the intervention, there were still differences at mid-and post-tests between the two groups, PBL versus TL.

5.5   The Relationship between Students' CT Skills and AAT in PBL

Research Question 3 for this dissertation concerned the relationship between CT (as measured by, CCTST) and achievement (as measure by the AAT), and was investigated using Spearman's correlations. By this, we wanted to explore whether higher CT skills were associated with higher achievement scores or vice versa, at pre-test, mid-intervention test and post-test. This was done for Total CT, but also for each CT construct separately.

Table 15:
Report of Relationship between Total of Students' CCTST and AAT (Spearman's rho, 2-tailed)

		Pre-AAT	Mid-Intervention AAT	Post-AAT
Pre Total	Rho	-.190		
CCTST	Sig.	.211		
	N	45		
Mid-Intervention	Rho		.097	
Total	Sig.		.527	
CCTST	N		45	
Post Total	Rho			.152
CCTST	Sig.			.318
	N			45

As shown on Table 15 above, the pre-test analysis showed that there is no correlation between Total CT skills using CCTST and pre-test for AAT ($r = -.19$, $p > .05$). At this level, all participants ($n = 45$) involved were in the similar levels of CGPA entry level [see Section 4.10.2 Pre-Entry level CGPA (previous semester)]. As a reminder,

the distribution of respondents into the PBL group (n = 23) and TL group (n = 22) had been done as stated by the Academic Division Department, UPSI. Similarly, at mid-intervention test (r = .097) there was no statistically significant correlation between Total CT skills using CCTST and AAT. Spearman's rho showed no statistically significant relationship between post-test for Total CT using CCTST and for AAT.

Overall, the correlation analysis result showed that there is no statistically significant relationship between Total CT skills using CCTST and AAT. However, it is possible that, while total CCTST is not related to academic achievement, specific CCTST constructs are. In order to explore the relationship between the CCTST constructs and AAT at baseline, mid-intervention and post- intervention, a series of Spearman's rho correlation were conducted.

The results for the CCTST constructs and AAT analysis are presented in the following table (see Table 16 below).

Table 16:

Correlations between Pre-test, Mid-intervention test and Post-test of CCTST Constructs and the associated AAT Scores (Pre-test, Mid-intervention test and Post-test) (Spearman's rho, 2 tailed)

		Pre AAT			Mid-Intervention AAT			Post AAT		
		PBL	TL	ALL	PBL	TL	ALL	PBL	TL	ALL
CCTST Inductive	Rho	-.236	-.129	-.144	.157	-.109	-.002	.179	-.344	.301*
	Sig.	.278	.568	.346	.473	.628	.987	.423	.177	.044
	N	23	22	45	23	22	45	23	22	45
CCTST Deductive	Rho	-.019	-.296	-.171	-.010	.109	.070	-.270	.109	-.089
	Sig.	.932	.181	.262	.964	.630	.648	.213	.628	.588
	N	23	22	45	23	22	45	23	22	45
CCTST Analysis	Rho	-.083	-.117	-.088	-.166	.166	.034	.044	-.145	.351
	Sig.	.707	.604	.565	.449	.460	.823	.843	.520	.018
	N	23	22	45	23	22	45	23	22	45
CCTST Inference	Rho	-.180	-.054	-.124	.176	.063	.087	-.089	-.080	.076
	Sig.	.411	.812	.418	.423	.781	.569	.686	.725	.620
	N	23	22	45	23	22	45	23	22	45
CCTST Evaluation	Rho	-.025	-.446	-.216	.213	.014	.048	-.134	-.388	-.136
	Sig.	.911	.038	.154	.329	.949	.753	.543	.075	.372
	N	23	22	45	23	22	45	23	22	45
CCTST Total	Rho	-.161	-.276	-.190	.163	.103	.097	-.109	-.267	.152
	Sig.	.462	.214	.211	.457	.648	.527	.619	.230	.318
	N	23	22	45	23	22	45	23	22	45

Focusing at pre-test, and as shown in Table 15 above, the relationship between the CCTST Inductive construct and AAT scores (for PBL and TL groups) was not statistically significant (r_{PBL} = -.24, r_{TL} = -.13 , p> .05).   Similarly, in post-test 2 (r_{PBL} = .18, r_{TL} = -.34.), Spearman's rho showed there was no statistically significant correlation between CCTST - Inductive construct and AAT at mid-intervention test. However, when considering the whole sample, CCTST - Inductive construct was related to academic achievement.

The correlation between CCTST – Analysis construct and AAT at baseline and mid-intervention test was not significant.   However, similar to CCTST – Inductive construct a significant correlation was found at post-test when taking the whole sample (r_{ALL} = .351) but this relationship was rather weak.

With regard to the relationship between CCTST – Evaluation construct and AAT, there was only one significant relationship found between baseline of CCTST – Evaluation construct and AAT for the TL group only (r_{TL} = -.45, p = .038) (Instead of this report r_{TL} only and the associated p value).

The Spearman's rho correlation between the CCTST - Deductive and AAT showed there was no statistically significant correlation at any stage of the research (pre-test, mid-intervention test, and post-test) for either group (PBL and TL) or when taking the whole sample (All).   Similar results were found when exploring the relationship between the CCTST – Inference construct and AAT where no significant difference were found at any stage of the research for any of the groups.

From the analysis above, the results showed that, unlike previously proposed in Research Question 4, the students' CT skill overall are not related to and therefore cannot be used to predict the students' achievement in Business Education (and therefore Regression analysis was not conducted).

5.6 Malaysian Undergraduate Business Education Students Perception and Interest toward PBL

Research Question 5 for this dissertation concerned Malaysian undergraduate Business Education students' perception and interest through PBL application. Specifically, it sought to ascertain if students held positive or negative perception and interest on the intervention described in Methodology section (4.6 Research Implementation).

In this part, the researcher seeks to understand students' perception and interest of PBL application in terms of the learning outcomes they felt and they gained as a result of the intervention. This part is intent on discovering the learning outcomes in terms of PBL application characteristics. It should be emphasized that the researcher does not involve the preferences and perception from the students in the control group (TL group). This is based on the objectives of this research which included observing the effectiveness of PBL implementation.

Due to small number of participant size (n = 45), it was not appropriate to use factor analysis on this data. Feedback from selected students' in PBL group (n = 23) was discussed to gather information about their opinion and assessment regarding PBL processes in the entire intervention. The opinion and statements are related to the PBL method for PEA3063 – Population Economics and Policy. The PBL assessment survey was divided into four sections; preferences and perception of PBL, benefits of PBL, motivation and effects of PBL on problem solving and CT. The participants who responded on a 5-point Likert Scales ranged from those who strongly disagreed (scale 1) to strongly agreed (scale 5). Due to the low number of responses at the extreme of the scale, the responses were combined to form three categories, namely; disagree (scale 1-2), not sure (scale 3) and agree (scale 4-5).

Generally, students in the PBL group are believed to give answers in this section based on their sincerity and honesty to express their faith. This is based on the consent submitted by the participants of this study at the early stage of research to be honest. If the students reported that they enjoyed it just to please the teacher, then this is outside of the researcher's control.

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5.6.1   Overall preferences and perception of PBL

Out of the 10 statements presented in order to view the overall preferences and perception of PBL (see Table 17 below), and the researcher classified this into three difference preferences and perception such as: like (items 1,2, 3, 9 and 12), outcomes (items 4,5 and 8) and activities (items 6, 10 and 21). Based on the frequency analysis, it was found that the 87% participants like this learning method, whereby 78% agreed that they enjoyed working on these problems more than listening to a lecture.   It was supported by 91% of the students who agreed that learning through problem solving is fun and 65% agreed that they liked the PBL method as an alternative of learning more than lecture although they were new in this method. Additionally 78% of the students did not agree with the statement that this type of learning is difficult.

Related to the application activities on PBL method, 87% of participants like the discussion activities and also majority of the participants (83%) agreed with the brain challenging activities which appeared in this method. Additionally, 56.6% disagree and 39% were not sure if they felt more anxious about having to seek information for the problems compared to listening to a lecture .

From the answers from participants, it was also found that 87% of participants gained more understanding and memorised the facts of economics and population with this method. However, a small minority (44%) was not sure if the the lecture from the lecturer is a more effective way to learn complex ideas than PBL, whereas 44% of participants agreed with this statement.

Overall, for preferences and perception of participants toward PBL method, this gained a positive feedback from students in PBL group.

Table 17:
Students Self-Report on Preferences and Perceptions on PBL Mean scores (n=PBL group = 23)

Subscale	Statement	Disagree (%)	Not sure (%)	Agree (%)	Mean (SD)
1	This type of learning is difficult	78.3	17.4	4.3	1.913 (0.848)
2	I enjoyed working on these problems more than listening to a lecture	17.4	4.3	78.3	3.826 (0.984)
3	I like this learning method	4.3	8.7	87.0	4.174 (0.777)
4	I gain more understanding about the basics of economics and population with this method	0	13.0	87.0	4.044 (0.562)
5	I can memorise the facts of economics and population through this method	4.3	8.3	87.0	4.000 (0.674)
6	I like the discussion activities	4.3	8.7	87.0	3.957 (0.638)
8	I feel that the lecture from the lecturer is a more effective way to learn complex ideas than PBL.	13.0	43.5	43.5	3.191 (0.839)
9	Although this method is a new process for me, I like this alternative of learning more than lecture.	0	34.8	65.2	3.739 (0.619)
10	I like the brain challenging activities	0	17.4	82.6	3.957 (0.562)
12	Learning through problem solving is fun.	0	8.7	91.3	4.130 (0.548)
21	I felt more anxious about having to seek information for the problems than I did listening to a lecture	56.6	39.1	4.3	2.261 (0.864)

(Response scale: Strongly disagree = 1, Disagree = 2, Not sure = 3, Agree = 4, Strongly agree = 5)

5.6.2   Perceived Benefits of PBL

As regards to the assessment of the benefits of PBL in Business Education, the results are displayed in the Table 18 below and it was classified as   benefits on facts or information, (items 16, 22, 28, 29, and 32) and benefits of skill development (items 13, 18, 26, 27 and 31).

The data indicated that 87% of participants that their interest in economics and population was increased through problem solving activities. This was supported by most of the participants (91%) who liked the PBL method as it involved studying in groups, helped to strengthen the level of thinking as well as communicating skills. In addition, 87% agreed with the statement that they were able to use the knowledge gained in other courses to help them make a logical conclusion. The students also agreed that PBL skills would help to strengthen various skills which would be beneficial for the students' academic career (83%) and future career (74%).

Table 18:
Students Self-Report: Benefits of PBL Mean scores (n=PBL group = 23)

Subscale	Statement	Disagree (%)	Not sure (%)	Agree (%)	Mean (SD)
13	The interest in economics and population was increased through problem solving activities.	0	13.0	87.0	4.087 (0.596)
16	Through PBL I learned how to defend my answer and information.	0	13.0	87.0	4.044 (0.562)
18	I feel that I am able to use knowledge gained in other courses to help me reach logical conclusions.	0	13.0	87.0	4.044 (0.562)
22	The search for facts through individual activities can help us to focus on important facts	8.7	17.4	73.9	3.783 (0.795)
26	I have developed skills that will be useful for me in my academic career.	0	17.4	82.6	3.913 (0.515)
27	I have developed skills that useful to me in my future career.	0	26.1	73.9	3.826 (0.576)
28	Through PBL I learned how to search for information (research articles, reference books, textbooks, etc) outside the lecture room.	0	8.7	91.3	4.044 (0.475)
29	Through the PBL method, I learned where to search for accurate information.	0	4.7	95.3	4.130 (0.458)
31	Through PBL, my soft skills (thinking, communication, group work, etc) improved as a result of the PBL process.	0	8.7	91.3	4.130 (0.548)
32	I rely more on my thinking skills compared to memorization	0	17.4	82.6	4.130 (0.694)

(Response scale: Strongly disagree = 1, Disagree = 2, Not sure = 3, Agree = 4, Strongly agree = 5)

5.6.3 Motivation

The PBL assessment also involved the motivation aspect to the participants and this was shown in Table 19 below. Five (5) items were presented and four (4) of them were agreed by the majority of the students which was about 83% to 96% of them; 91% stated that learning through PBL is fun, 87% stated that PBL stimulated the participants to study and to learn as well as enhanced in the process of finding answer to problems; 96% agreed that PBL improved their attitude towards learning. However, 57% disagreed and 22% were not sure whether they would have learned more in a lecture setting compare what they did with PBL. Overall, 83% agreed that they would enrol in another PBL course if given the opportunity.

Table 19:
Students Self-Report: Motivation Mean scores (n =PBL group = 23)

Subscale	Statement	Disagree (%)	Not sure (%)	Agree (%)	Mean (SD)
23	I feel that I would have learned more in a lecture setting than I did with PBL.	56.5	21.7	21.8	2.696 (1.063)
33	The problems in PBL process have motivated me to study and to learn.	0	13.0	87.0	4.304 (0.703)
34	My attitude towards learning improved as a result of these problems.	0	4.3	95.7	4.087 (0.417)
35	My drive to succeed was enhanced because I was motivated to find the answer to these problems.	0	13.0	87.0	4.087 (0.596)
36	Overall, I would enrol in another PBL course if given the opportunity	0	17.4	82.6	4.087 (0.668)

(Response scale: Strongly disagree = 1, Disagree = 2, Not sure = 3, Agree = 4, Strongly agree = 5)

5.6.4 Perceived Effects of PBL on Problem Solving and CT Skills

As regards to the perceived effects of PBL on problem solving and CT skills towards Business Education learning, Table 20 below showed the students responses to two batch of questions; problem solving (items 7, 11, 24 and 25) and CT (items 14, 15, 17, 19, and 20). In support of the effects of PBL on problem solving, 87% of participants in PBL group agree that they understood more about problem solving skills and 91% agreed that their knowledge is improved through problem solving activities. It is noticeable that their discussion activities can improve the understanding of lesson (91%) and through this method, 74% of participants agreed they can make a better hypothesis statement. On the other hand, some were still not sure (26%).

In the same way, PBL does have an effect on students' CT, whereby 91% of participants agreed that their ability to think critically about the problems has improved. Virtually the same percentage (91%) agreed that PBL encourages their ability to critically evaluate information and not be too quick to jump to conclusions.

Additionally, 96% felt that they can approach questions in a logical manner and 91% felt that they could make a logical decision based on their understandings around the presented PBL case study and current issues . Moreover, participants also felt that their ability to reach logical conclusion has improved (87%).

Table 20:
Students Self-Report: Effects of PBL on Problem Solving and CT Skills Mean scores
(n=PBL = 23)

Subscale	Statement	Disagree (%)	Not sure (%)	Agree (%)	Mean (SD)
7	I understand more about problem solving using the P PBL method	0	13.0	87.0	4.00 (0.522)
11	The knowledge is improved through problem solving group activities	0	8.7	91.3	4.087 (0.515)
14	I feel that PBL has taught me how to approach questions in a logical manner.	0	4.3	95.7	4.174 (0.491)
15	I feel that PBL has taught me how to make logical decisions	0	8.7	91.3	4.087 (0.515)
17	Through PBL I learned how to critically evaluate information and not be too quick to jump to conclusions	0	8.7	91.3	4.087 (0.515)
19	Through PBL, I feel that my ability to reach logical conclusion has improved.	0	13.0	87.0	4.087 (0.596)
20	Through PBL, I feel that my ability to think critically about the problems has improved	0	8.7	91.3	4.087 (0.515)
24	The discussion activities can improve the understanding of lesson	0	8.7	91.3	4.087 (0.515)
25	Through this learning method, I can make a better hypothesis statement.	0	26.1	73.9	3.783 (0.518)

(Response scale: Strongly disagree = 1, Disagree = 2, Not sure = 3, Agree = 4, Strongly agree = 5)

5.6.5 PBL Students' perceptions and understanding of CT skills

The study aimed to explore the perceptions and understandings related to the CT core skills targeted by the current intervention that PBL students undertaking the PEA3063 – Population Economics and Policy course developed (shown on Table 21 below). These core skills were developed by Facione (2006) and measured by the CCTST subscales.

The data showed that the majority of participants agree that problem solving activities in PBL cases allowed them to understand how to make an analysis (91%), evaluation (96%), inference (91), deductive and inductive reasoning (87%). However, there are a few participants who are not sure that the problem-solving activity in PBL method can give them the opportunity to master the ability of analysis, evaluation, inference, deductive reasoning and inductive reasoning.

Table 21:
Students' perceptions (mean scores) around the extent to which the PBL method is supporting their understanding of the core CT skills (explored by the question: I think the problem solving activities give me the chance to understand)

Construct	Frequency (%) Not sure	Frequency (%) Agree	Frequency (%) Strongly Agree	Total (Agree / Strongly Agree) (%)
Analysis	2 (8.7)	18 (78.3)	3 (13.0)	21 (91.3)
Evaluation	1 (4.3)	20 (87.0)	2 (8.7)	22 (95.7)
Inference	2 (8.7)	18 (78.3)	3 (13.0)	21 (91.3)
Deductive reasoning	3 (13.1)	19 (82.6)	1 (4.3)	20 (86.9)
Inductive reasoning	3 (13.1)	17 (73.9)	3 (13.0)	20 (86.9)

(Response scale: Strongly disagree = 1, Disagree = 2, Not sure = 3, Agree = 4, Strongly agree = 5)

5.7 Malaysian Business Education Students' Suggestions to Improve the PBL Method

I have used the content-analysis on students' suggestions to improve the PBL approach (toward the open-ended question "Please give your opinion on how to improve the PBL method that you have already experienced"). In my case, it has been performed and analysed according to the overall responses of finding or ideas presented by participants of the study. This method shows the accuracy and can be described as an expression of the feeling and emotion of the 23 participants regarding their problems and suitability of using this method itself in teaching and learning process. The results of this analysis were quite interesting and categorise into several aspects such as;

a)   Problem quality (questions design),

b)   Group activities (interested to solve a problem as a group),

c)   Lecturer's role,

d)   Time allocation (sufficient time) and

e)   Problem solving method (abilities to solve the problem)

In the following sections, each of these categories is expanded to illustrate and discuss the types of suggestions students provided.

5.7.1   Problem Quality (Questions Design) and Problem Solving Method

In relation to problem quality, participants suggest that the problem presented should be;

- Short and suitable with students knowledge.

- Start with easy problems then slowly increase the difficulty level based on basic economics and population issues in Malaysia and world, socio-economics issues and related to PEA3063 – Economics Population and Policy courses.

- Challenging, analytical and encourage students' to the current issues.

- Including all the topic based on syllabus.

- Based on actual facts and useful (relevant), and these findings are supported with the opinions "...include attractive and easy to understand extra examples and applications".

- The problems provided should be different between groups for each session. Examples of student opinion that support this are, "A variety of questions with different difficulty for every PBL group so that a variety of ideas can be expected". Another student also gave the same opinion, "The problems given should be different for every group so that output from each group could be shared and we could get different idea".

- Not to focus on many issues.

The students also suggested that problem solving method in PBL should be more focused and implemented on reality problem solving method such as real problems in Malaysia about population and issues.

5.7.2   Prerequisites and expectation of group members

Based on students activities, the suggestions are;

- Group members must be heterogenous including higher achievement, moderate and low level achievement students.

- Learning in group spirit should be encouraged among students. One student gave his opinion, "It's supposed to be group work but there's one student who didn't contribute...just did the typing and the editing. I think we are the ones who were really committed to finish the assignment. This is not fair, what we had to do. Dr XX has to take action...".

- Group activities should be encouraged compared with individual learning activities.

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- All the students must be proactive, coperative and give a full commitment within discussion session.

- Discussion between group member should be more focused and detailed to make sure all the learning issues is easy to understand.

- Discussion between groups must take place to encourage the students share and exhange facts and information within their problems.

5.7.3 Lecturer Rules

The participants also suggest that lecture/facilitator;

- Play an important role as a guidance and accelarator on problem solving activities. One student mentioned, "The in-depth explanation by the lecturer has enabled the search of resources and information". This was supported by another student, "The lecturer should ensure that we do the PBLmethod properly to get the best result".

- Give more attention to the reflection phase in the final activities to make sure the students can retain their knowledge of the PBL process.

- Give examples of complete solution.

- Make sure that all students give attention and involved in all discussion activities and the activities should also motivate them. One student commented, "...the lecturer does not only give information. He should also emphasise and give encouragement to us so that we can get rid of the negative perception about this method". The student also said that, "The understanding towards the PBL activity should be more detailed so that we as the subjects can implement the PBL activities more efectively".

5.7.4   Time Allocation

Time is a constraint factor in this study, and students gave the suggestion that they must have a proper time allocation to;

- Try to get involved and become comfortable with this method.

- Think and give full attention to problems.

- The problems should be distribute to students early (a week before) to make sure they can get ready and bring a draft or materials to the discussion session. This finding is supported by one student, "Maybe it would be possible if the assignments are given much earlier. Not during class time...even better if they are uploaded in MyGuru. A week or maybe two weeks ahead ! So that when we enter the class we have an idea of what to do and we can give better commitment and finish our tasks better".   Another student in the group commented that time allocation should be suitable with the students' learning activities and schedules, "...the implementation period was quite short. We need more time. Maybe for shorter periods, this method can show a better improvement and development".

5.8   Lecturer Perception Regarding PBL Method

In this study, open-ended questions were given to the involved lecturer in PBL class. The aim was to get feedback from involved facilitator/lecturer regarding their problems and suitability of using this method in teaching process. The information gathered from this feedback is considered as additional information to support the study findings. These responses from the lecturer were analysed according to the overall responses and categorised into three categories as follows:

- Comparison between ordinary methods which were used in PEA3063 - Population Economics and Policy class with PBL method;

- The problems and limitations faced by the lecturer when implementing the PBL approach and

- Suggestions to modify this method.

Overall, compared to conventional and common teaching process, the involved facilitator/lecturer provided suggestions that:

- PBL is a good method becuase this method encourages the students to use thinking skills in the learning process.

- PBL is more focused on students' diligence and attention to solve and handle the problems given.

- PBL encouraged the cooperation between students, and force them to work as group.

- Students in PBL group are more independent.

- The students in PBL group have a chance to plan and search the information more independent and not depend to lecturer.

The lecturer also made comments regarding to problems and limitations when they conducted the PBL session such as;

- Students must have basic knowledge and detail preparation for each issues given before they can solve it.

- Students could not get used with PBL method properly because they were still comfortable with conventional method.

- Students take more time than allocated to solve the problems given.

- Lecturer/facilitator must have skills and interest to conduct and implement the PBL method.

Based on feedback from the lecturer, the effectiveness of PBL method was;

- Students have a chance to expose themselves to questions that need a higher order thinking skills.

- Students think systematically.

- Students more independent because they must search all the facts and information independently.

- The teaching and learning process is more focused on students' activities and ideas.

- Students can manage all the learning ideas and informations in long term memory.

- This method can avoid students from getting bored because they must think actively and continously.

- Students can provide the answer for each problem given accurately.

- Students can provide and experience themselves with challenging questions.

In this feedback, the lecturer involved had a chance to give an opinion to improve the quality of PBL method based on previous experience such as;

- The questions provided should be suitable and balanced with students ability.

- The training should be adjusted according to time allocation.

- More time allocation to PBL activities.

- Adjust the teaching and learning activities based on course content and objectives of syllabi.

- The involved lecturer should be provided with more comprehensive training regarding PBL to make sure they have the confidence and skills when implementing the PBL activities.

- PBL class should be more focused on discussion and problem solving activities within and between groups.

5.9   The Summary of Findings

In this chapter, the details of the research findings based on the data analyses to establish and shows relationships between PBL and traditional teaching approach, the performance of CT skills, academic achievement for PEA3063 courses as well as the students perception and interest in of PBL implementation. The students CT skill were measured and analyzed using CCTST, while the academic achievement for PEA3063 through the initial, the middle and end of semester test and also the students' perception and the interest of PBL refers to the questionnaires that has been answered by the students in a treatments group. The views of the lecturer involved in PBL were only used as supplementary information to find out the constraints, ideas and issues faced by the lecturer engaged when implementing thePBL.

The analysis findings of the study was done using the SPSS analysis procedure by taking into account a descriptive statistics, ANOVA, ANCOVA, Spearman Rho correlation and regression. The results of data analysis indicate following finding;

a)   There was no significant difference in the overall total score of CT using CCTST between PBL and TL groups on pre-test and mid-intervention test.   A detailed analysis for the five subscales of CCTST showed a difference at post-test between the PBL group and the TL group in relation to the Inductive, Analysis constructs and CCTST-Overall.

b)   PBL students' showing significantly higher scores on the overall Post-CCTST scores (M = 12.00, SD = 2.89) compared to the TL group (M = 10.32, SD = 1.59).

c)   There was no overall difference in the effectiveness between the PBL and TL approach in relation to the overall total score across CCTST subscales using a mixed between-within subjects ANOVA, where the main effect comparing the two types of intervention was not significant. However, there was a significant interaction between the teaching approach (PBL and TL) and the time periods, which suggested that while there was no overall difference across the three time periods there, were indications of a difference between PBL and TL at post-test only, as confirmed by the t test results. It is also suggested no differences

between the PBL and TL approach in relation to the overall total score across CCTST subscales using a mixed between-within subjects ANOVA with the exception of the Analysis subscale scores when the main effect comparing the two types of intervention (PBL, TL) of the Analysis subscale scores was significant and very large effect.

d)   For the effects of PBL on students' academic achievement as measured by an instrument, the AAT showed at baseline no differences exist between two groups. At mid-intervention and post-intervention test the PBL method yielded significantly higher Achievement scores, therefore indicating better students' academic achievement.

e)   The correlation analysis showed that there is no statistically significant relationship between total CT skills and AAT.

f)   The students' perceptions of the PBL method showed that there was positive feedback from them. The majority of participants also agreed that problem solving activities in PBL cases allowed them to understand how to make an analysis and inference (91.3%), evaluation (95.7%), deductive and inductive reasoning (86.9%).

g)   The students preferred to focus on learning because they liked the activities and the group discussions in PBL. The PBL activities also involved challenging the brain, and encouraged the students to learn more by thinking compared to memorization. The students gave more attention to the important facts through PBL approach. This are also allowed them to strengthen their understanding in learning.

h)   The students provided suggestions around the PBL implementation, and specifically how it should give proper attention and focus on designing the problem as well as the quality of the questions. Also suggestions related to the group activities, the role and involvement of the lecturer, and how it should provide adequate time and PBL training for students to become more competent on solving problems.

i)   The involved lecturer's suggested that the PBL method is a good method as it encourages the students to fully utilise their thinking skills in the learning process. The lecturer also commented on problems and limitations associated the implementation of the PBL method in the classroom. Based on previous experiences, he provided suggestions as to how to improve the quality of PBL implementation.

j)   According to the lecturer, the PBL activities were able to support the efforts of students, encourage collaboration between the students, helped the students to become more independent and provided opportunities for the students to make plans, and as such, prevented the students from becoming bored.

It concluded the finding of the study supported the positive effects of PBL toward students' CT skills and performance in academic on Business Education in Malaysia, however, the students' CT skills could not be used to predict the students' performance in the Business Education subject. The students and lecturer also have a positive preferences and perceptions toward the PBL implementation.

CHAPTER 6

DISCUSSION

6.1   Overview

This section discusses the research findings, and begins with a discussion of the effectiveness of PBL with regard to students' CT skills following the implementation of the intervention for students who registered for the PEA3063 – Economics Population and Policy course. The effect of this instructional design on students' academic achievement also is discussed. The next part of discussion discusses the students' perceptions and interest of learning via PBL methodologies and the last part of the discussion elaborates on the involved lecturer perceptions and suggestion toward the implementation of PBL. This section ends with a summary.

6.2   Introduction

Previous researchers agreed that CT skills could be improved through the explicit and implicit teaching and learning process. In this study, the researcher had adapted and used the McMaster PBL Model (Barrows & Tamblyn, 1980) as a basis to create questions or case studies for the PEA3063 – Population Economics and Policy subject which was used in the Bachelor of Education (Economics) programme in UPSI, Malaysia. The effectiveness of the students' CT skills was measures using the CCTST and AAT and compared with the TL method.

In this study, a Quasi-experimental design with 'mixed between-within subjects repeated measured' with baseline intervention test, mid-intervention test and end of semester intervention test was used.   A total of 45 students who registered for the PEA3063 – Population Economics and Policy subject were chosen for the

intervention which lasted for 14 weeks of the semester in the July-October 2010/2011 session. Twenty-three (23) of the students were involved in the PBL method and 22 students were involved in the TL approach. The topics used were all the topics in the PEA3063 – Population Economics and Policy syllabus.

The pre-test was implemented a week before the intervention period, whereas the mid-intervention test was given after the 7^{th} week intervention and the post-test a week after the completion of the intervention (during the end of semester exams). To support the findings of the study, questions on perception and interest were also given to the PBL students while the open-ended questions about PBL implementation were also given to the lecturer/facilitator involved in the implementation of study. The findings had been analysed using SPSS 18.0 which involved analysis of descriptive statistics like mean, standard deviation and variance. Inferential analysis including ANOVA, Spearman's Rho Correlation and Regression were also used.

6.3   The Effectiveness of PBL toward Students' CT Skills

The research findings show that the performance of students' CT skills as measured by CCTST in the PBL method is better than the performance of students enrolled in the traditional method. CCTST shows that there is a difference between the two groups in relation to Inductive and Analysis constructs in the post-test. This finding is supported by the questionnaire on students' perception and interest in PBL, by combining the two responses 'strongly agree' and 'agree', we find that that the problem solving activities provide opportunities for the students to understand the inductive (86.9 %), deductive (86.9 %), analysis (91.3 %), inference (91.3 %) and evaluation (95.7 %). There were no significant changes in CT scores by students enrolled in the traditional method. The findings confirmed that the PBL is significant in enhancing students' CT skills. In general, these findings also supported the previous studies related to the PBL method in increasing students' CT skills (Yuan et al., 2008).

Upon further analysis, there is a possibility that this phenomenon occurred the students in PBL group were involved in CT skill learning in an explicit manner. In the PBL case studies, the concept of inductive, deductive, analysis, inference and evaluation had been emphasized. Therefore, the students in PBL group might have using and developing these skills. This situation made it possible for the students to handle the CCTST properly might have enabled the skills although outside the context of the PEA3063 – Population Economics and Policy subject. This was also reflected in comments made by the lecturer:

> ...the case studies given in the PBL have stimulated the undergraduates to think in a more critical way to solve the problem. The students in the group have to work independently as well as develop teamwork, this aspect is important in economics.

> "...besides that, PBL has also exposed the students to problems which require them to solve using critical and creative thinking skills".

The results of this study suggest that there might been a transfer of CT skills when the students were presented with a situation or a picture of the actual situation to solve the case studies. There is a probability that this thinking, once created or established, will remain in the minds of the students. This is further supported by the results of the implementation of the PBL in over a long time interval. In the first seven weeks of intervention, there was an improvement compared to pre-test. The supplement at the end of the Post-test showed that the PBL students' CT skills had a better momentum compared to the students in TL group. However, it is suggested that students can master these skills better if they use PBL approach for a long period. This is further supported by the students' responses that they are ready and will be interested to enroll in subjects that use PBL as a teaching method.

While in the TL group, the concepts of CT explicitly have not been emphasized, the opportunity for them to learn and develop CT skills was minimal. Their skills on CT haven not been fully utilised because in the TL approach they are more dependent on input from the lecturer. This is also suggested by the changes in their CT skills

which were not significant. Furthermore, the suitability of the CCTST in Malaysian teaching and learning environment is rather questionable as the questions given in the CCTST are more suitable for the western environment and this may impede the students' comprehension.

The use of case studies as a medium of problem solving in PBL method is consistent with the CT skills principles as an amalgamation of attitudes, knowledge and capabilities. These principles, as proposed by Watson and Glaser (1980) include;

a) curiosity and the ability to identify the existence of problems and receipt of evidence that supports what is interpreted as true

b) knowledge of the conditions to form a valid solution

c) generation of ideas and generalizations that are supported by logical proofs and

d) the ability to apply the attitudes and knowledge.

In this case, students in the PBL group were able to practise and apply CT skills compared to the TL group, especially in analyzing and selecting relevant information, which is to define the problem required in submission of this thinking. While the assessment of information obtained from various sources should be assessed in terms of reliability and validity. During the search process of this information in problem solving, CT skills are being applied by students in the PBL group to search, selection and evaluation of relevant and accurate information. The CCTST constructs included inductive, deductive, analysis, inference and evaluation to solve the problems that were given for PBL activities. This process does not apply to students in the TL group. They just do the problem solving activities based on the guidelines set by their lecturer or the scheme contained in references or sources. Here, there is no opportunity for the TL group to analyze and evaluate the information and then to apply CT skills and logical reasoning.

According to Gokhale (1995), through the PBL process students had the opportunity to have an experience in collaborative learning and exchange their ideas actively in

the group discussions, and also have a chance to create and encourage interest and stimulate their CT skills development. Students have an opportunity to be able to express more of their opinions, develop ideas, interact more with the tutor and their peers and learn for themselves (Douvlou, 2006). This is in line with Totten et al (1991) that the sharing of learning has encouraged opportunities for students to discuss, responsible for self-learning and become more critical in action.

The students also were able to have a variety of effective learning strategies for the subjects that they took. Besides preventing them from simply memorising the concepts, this also gave them a positive advantage, in that the knowledge they acquired could be used for long-term effectiveness and also for higher levels of learning.

For the TL group, it appeared that the learning was more based on one-way or passive communication from lecturers to students. Students just learned individually and these conditions did not encourage student to become more critical. The results showed that there was no increasing in the level of students' CT skills.

In the process of solving problems based on the case studies given to the PBL group, the students had utilized the information given. In this situation, the lecturer involved had applied cognitive coaching whereby help was given via explicit thinking skills. In this case, the students in the PBL group had to apply their thinking, whereby the thinking skills would be used as the cognitive approach. As such, the problem solving skills in PBL would involve interaction and meta-cognitive process and reflection among the students in the groups and the lecturer would act as a scaffolding in encourage the students' thinking.

According to Vygotsky (1978) and Gokhale (1995), CT skills are generated by collaborative learning, whereby they would increase the problem solving ability. This ability can developed if the students are exposed to various interpretations of problems. In PBL, group work activity enables the students to involve themselves in applying external knowledge and CT skills and as such utilize the sources as the most important sources in showing the students' intellectual value. Every member of the PBL group has his or her own experience or knowledge and this makes it special and

helps to contribute towards the learning process. This informal situation promotes discussion and interaction whereby the interaction among the students encourages them to exchange ideas.

Based on researcher observation during the intervention, students in the Traditional group also applied collaborative learning. This collaborative learning took place when students were working in a group discussing the task with colleagues in order to solve the problem and complete the assignments given by lecturers but not to a great extent. This contrasts with the students in the PBL group in which they apply the maximum as possible collaborative learning. This is not only on teaching and learning session but also throughout the whole semester.

The principles and processes presented in the PBL case study fulfill the elements suggested by Meyers (1986) and Tiwari et al. (1999) for the development of CT skills based on the principles below:

a) PBL comprises the principles in the initial learning which starts with the problem – by posing the problem discretely to the students who would be solving them, their attention and interest would be stimulated. Next, when their attention and interest has been stimulated, the students are encouraged to think critically and build their own confidence in their own ability to analyze and solve problems.

b) Discussion among the group members would count as a meaningful and important aspect in maintaining the students' interest. The questioning and opinion-giving session during the discussion helps the students build the required mental structures for the CT skills.

c) Exposure to opinions from the students in the other groups which would of course differ promotes relevance of individual opinions among them and also stimulates them to reason with and interpret the information acquired in line with the perspectives and objectives of problem solving. Through PBL, the students would share the information acquired together with their group members and make alternative analysis.

d)   The supportive and assuring environment in the PBL group enables the students to try various ways of thinking. PBL recognizes that students in each group are the main focus in the learning activity and that they have the ability to think for themselves. This acknowledgement of the students as active and thinkers promotes respect and belief in developing a positive learning environment.

This echoes the government focus in the nation's education system which is to develop young people who are able to think in creative, critical and innovative manner and to have a high need for knowledge. This message was announced by the Malaysian Prime Minister, Najib Razak during the 1Malaysia National Teachers' Gathering in October 2010. This is in line with the Government's efforts which are another focus to be implemented in the educational system and a positive step towards transforming the education system which has been exam-based for quite sometimes. To sum up, these outcomes suggest that, overall students who were involved with PBL methodology showed positive improvement in CT skills as measured by CCTST compared to the students who were involved with TL.   Additionally, the PBL participants learned to justify and apply more rational CT skills when involved with learning content during the PBL implementation.

6.4   The Effectiveness of PBL toward Students' Academic Achievement

As already shown in the analysis of data, the students in PBL group showed higher achievement compared to the TL group in the AAT. It appears that the students in PBL group were able to make use of the subject contents learned and the information search activity also increased their understanding of the concepts learned. This is in line with the findings of previous studies whereby it was found that the PBL method was able to produce positive results for the courses including the Business subjects (Gabr & Mohamed, 2011; Kimberly et al, 2006; Martin et al., 2008; Sahin, 2010). On the other hand, the students in the TL group showed the opposite performance. At the pre-test stage, the achievement of two groups was almost equivalent. While there was an improvement in achievement in the PBL group, the TL group did not show an overall improvement. It is possible that students in the TL group, still bound by the rote-learning are less likely to apply teaching and learning, are more involved high-

level thinking such as analysis, problem solving and descriptive, especially for the end of the study subjects such as PEA3063 – Population Economics and Policy course.

The increase in PBL students' performance in this study supports the research assumptions;

a) To solve the population economics and policy problem, the students must use declarative knowledge of the subject with analytically and creatively. Thereby, it will increase the students understanding toward the learning topics or subject.

b) The students were actively involved in problem solving process, where the knowledge was always applied to new situations. Therefore, the more involved the students were in the problem solving process, the more often students had to think about the topics or subject. It is anticipated that this process also increases students' understanding of the topics or subject.

Evidence gathered from the survey of students' views indicated that the success of PBL was partly due to the emphasis on problem solving strategies and processes in the subject of population economics and policy learning. The students have a chance to monitor the processes and discussions, generate hypotheses, analyze, predict, summarize and record the outcomes and think further about the solutions. This is in line with findings from Smith (2005) that support that such problem solving processed are relevant and should be used in teaching and learning in business subjects in particular.

The learning processes were quite different in the TL group. These students were taught mainly through lectures and tutorials and, therefore, might be described as rather passive learners. They were still being taught with the culture of individual learning, without making use of group discussions. It is anticipated that this results in fewer opportunities to develop CT skills among the students. As Kember (1996) and Frost (1996) support, the use of lectures or conventional learning methods does not enable a change in the students' early perceptions about where knowledge is coming from (the tutor through a lecture or tutorial versus their engagement with discussions or debate with other learners). On the other hand, the learning and teaching

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approaches used in the PBL group require the students to understand in depth and utilize the contents of the main topics of the subjects. This then becomes the basis of problem-solving skills enabling the students in this group to become more skilled in utilizing and understanding the contents of Population Economics and Policy compared to students in traditional group.

The PBL method is consistent with the constructivist approach where students actively build their own knowledge through group discussions, interactions and the search for information. On the other hand, traditional students have less chance to explore and built their own knowledge, as knowledge is "transmitted" by the tutors, which produces different levels understanding of subject content (not as deep). This difference is also caused by rote learning in TL and higher order thinking implementation in PBL method. This might explain some of the significant difference in achievement between the PBL and the traditional group. This finding is consistent with other studies done by (Folashade & Akinbobola, 2009; Mokhtar et al., 2010; Selcuk, 2010; Yaman & Yalcin, 2005), all pointing in the direction of how the use of problem solving strategies can improve student achievement especially in higher order thinking question and problems (based on Bloom's Taxanomy). This finding is also in line with the Hierarchy of Learning identified by Gagné (1965) which classified the problem solving activity as a higher level of learning.

Based on the study by Schmidt (1984), problem analysis processes take place in small group discussions and stimulate the existing knowledge and, therefore, it becomes easier for students to assimilate, understand and memorize new information. According to Gijselaers and Schmidt (1990), the frequency of cognitive processes causes the knowledge to become reinforced in the long-term memory and this leads to in-depth learning. This in-depth learning is also reinforced when the idea or information is presented in a more meaningful context. The situational cognitive process which occurred in the PBL group discussions students had in this study created a more meaningful learning context and provided encouragement to acquire and look for new ideas and information which may be needed to solve the existing problem.

Gijselaers and Schmidt (1990) also agree that learning can also occur when the student faces a cognitive conflict based on previous learning experiences or the current learning situation. This conflict leads the student to apply self-directed learning or work with their friends in the group to solve the problem using information searching, discussion and brainstorming to get the best results.

At the beginning of the intervention, as some students reported, they did not appear to be used to the implementation and solving of case studies using PBL. However, after they had been given time and a briefing on how to use PBL, this seemed to help them to identify and solve the problem. When the learning of PEA3063 – Economics Population and Policy was related to everyday situation and current issues, the students in the group were motivated to learn (Gabr & Mohamed, 2011; Naznin et al, 2008). The guidelines and explanation given to the students in the early intervention had helped them to apply and to organize the steps on how to solve the problem effectively. This in turn helped the students to think continuously, systematically and critically. The lecturer or facilitator also played a part in assisting and providing stimulation to the students especially in understanding the questioning concept in PBL. As such, the students were able to acquire new concepts and knowledge via the solving of problems. They were able to apply existing knowledge and current knowledge in finding the answers and solving the problems given.

For a PBL group to work effectively, every member should be involved in the problem solving process. Even though some members' contribution might be small, it can still be very useful to them in the discussion session whereby they have to explain and justify the suitability of the ideas. According to Moust et al (1986), the students have to explain covertly although they may seem passive at first and this is supported by Geerlings (1995), who stated that if the students learned in a problem-based environment, they would need to participate actively to process ideas or information based on the problem itself.

As stated by Schmidt and Moust (2000), students in a PBL environment would adapt their existing knowledge to the problem presented and then try to solve and provide a logical explanation. According to De Grave et al (1996) a change of concept (theory building, and to a lesser extent, data exploration and meta-reasoning) also occurs in

PBL due to the suggestions and opinions given by the members in the discussion group. Due to this, PBL has been identified as being able to maintain knowledge for longer compared to TL. Even though the effects on their learning might not be as evident at the beginning, PBL effects on student learning become more evident when they are able to process the information and ideas more effectively and in detail.

Another effect of the PBL implementation is related to the fact that the students were able to identify any gaps in their knowledge and they tried to fill them in by using information search and ideas from many sources. According to Du (2006) and (Silen, 2009), active learning in PBL leads to self-directed learning. The need for problem solving leads the students to integrate their existing knowledge with new knowledge acquired through information or ideas searched. Using this method, the students not only learn using facts but they are also involved in looking for relevant information and ideas for solving the problems. Indirectly, deep-learning is stimulated to develop the students' ability to draft and organize declarative knowledge in the subject that they are studying.

6.5   Relationship between CT Skills and Academic Achievement in PBL

The findings in Chapter 5 showed that no significant relationship exists or, if there is any, perhaps there is a weak relationship, between CT and academic achievement. The findings are similar to Suliman's (2011) study that showed no significant relationship between learning abilities or styles and social-emotional intelligence and academic success. The detailed analysis for each CCTST construct showed no significant relationship. At the baseline test, all the respondents involved showed a fair level of CT skills. This could be due as at the baseline level, the achievement test for both groups were in the form of objective questions which were used to test the students' understanding and their knowledge of the economics course that they had learnt since their first semester until the beginning of the intervention. This was compared to the mid-intervention test and end of intervention test which really covered the whole of the PEA 3063 - Economics Population and Policy syllabus. The reason for this could be because the questions for each AAT for the PEA 3063 –

Economics Population and Policy subject were higher level questions (application, analysis and synthesis) according to the Bloom's Taxonomy. This type of questions required the students to think and then to apply their CT skills especially in solving questions which are in subjective and essay form. Another factor might be the intervention period for PBL which could be rather short (14 weeks) and this might not be enough to get the full benefits from CT. As such, there is a possibility that there is no strong or moderate correlation between CT skills and academic achievement.

Furthermore, the use of CCTST may not be suitable for the learning environment in Malaysia. The CCTST has been prepared based on the learning environment in the Western countries especially in the United States. Although, the researcher tried to minimise the respondents' problem of understanding the questions in the CCTST by translating the questions into the Malay Language as a guide for the respondents but the CCTST in English was still used as the main questions. However it still remained an issue in terms of its precise sentence structure and meaning.

Another point was that based on previous studies which showed positive relationship between CT skills and academic achievement, the studies involved focused on the science, technology and engineering courses. This study is believed to be the latest in Malaysia and the first in the field of Business Education at doctoral level. As such, the implementation and effectiveness of PBL in Business Education could be considered in the initial steps and may show less effective results based on the studies done in the field of sciences, technology and engineering.

6.6   Affective Effect: Students Perception and Interest towards PBL

The data from students' questionnaire showed that students believed the learning through PBL is easy compared to the conventional method, therefore the students enjoy this learning method. This could be because the students felt that the usual method was boring. Additionally, when they are introduced with a new challenging environment and methodology of learning like PBL, they felt uneasy and a bit overwhelmed, but learning through PBL is more fun. Typically, according to Sulaiman (2011), since being in primary school, students have only been exposed to a

lecture-based, teacher-centred and well-structured syllabus, involving rote-learning. The lecturer agreed that:

> "PBL is a good method because this method encourages the students to use thinking skills in the learning process".

The lecturer also indicated that:

> "PBL is more focused on students' diligence and attention to solve and handle the given problems".

While this finding is also supported by comments from a student:

> "Through PBL we can present our ideas without any constraints and obstructions. We are free to voice out our opinions. Not afraid of mistakes or criticism from lecturers. Furthermore this method is more fun".

The lecturer also had the same perception.

> "PBL helps to make the students less bored. They need to become always aware, and it is more effective to study either individually or in groups".

Although at the early stage of PBL gave some problems to the students, but eventually they liked the activities and enjoyed working in a discussion group.

> "Not sure what to do at first stage. But the lecturer was nice and knew how to get us interested. It became quite fun...in the normal class we just listened to what the lecturers said while copying the notes. But with this method we had to do on our own. We had to search for something ourselves. We had to discuss in the group. In this way, we know what to do and what to answer. This was a challenge to us!"

In general, students who were involved in the PBL method feel that they are encouraged to think and believed that their thinking skills had improved after going through this method. The students also have a chance to gain a meaningful interaction with their group members on how to solve a problem, to discuss, to explain their ideas and present it to the group member without prejudices. According to Sulaiman (2011), this is because they managed to use their CT in generating related ideas in solving their course problems. Additionally, some of the Business Education students said that these learning activities helped them to think in terms of cause and effect for every problem they considered (Sulaiman, 2011). Thus, PBL is a fun method to the students even though it is a new approach and difficult at the early stage. PBL is able to foster and attract students to become an active learner. This is one of the positive effects of PBL method.

In this study, the PBL tasks are implemented within their own group members only. It is proposed that the implementation should be between or inter-group members and that the activities can attract students' interest and involvement. This contributed to student training in PBL, and enable transference of knowledge.

As suggested by students:

"...if we have been given an opportunity to discuss not only among members of the group, but with other people. With this new approach, we did not get bored..."

"I hope the activity is not 100 percent with friends in this group. If possible, let us do the activities with friends in the other groups...then we can get many ideas, many approaches to solve the problem of how the lecturers want to...furthermore, we have a fun time when we present the results".

This was also supported by the students' opinions:

"I think this method has to be applied widely. Not only in this subject. Maybe for all courses even though it may be hard in the

beginning, even better if we can do it across the faculty or stream. Not only in certain subjects. The university has to think about this..."

The opportunities and use of PBL as a teaching and learning methodology are wide and it can prove to be a time-saving method by combining a number of topics or issues in one PBL problem, where the students felt they learnt better and more challenging. For example, a case study in topics related to birth and population rate could be combined with population mortality. Through this approach, during the week or topic of discussion on birth and population growth, students not only mastered the cause and the effect of births and population growth, but they would continue to relate to the causes of death or termination of the population and the effects of population growth to the national as specific and global as general. It was based on some feedback of students:

"Maybe it would be possible if the assignments are given much earlier. Not during class time...even better if they are uploaded in MyGuru. A week or maybe two weeks ahead! So that when we enter the class we have an idea of what to do and we can give better commitment and finish our tasks better".

The lecturer involved in conducting the PBL sessions also had the same opinions with students where;

".... easier if the topic of the syllabus was consolidated in the case studies during given to the students. They will be able to learn and resolve the issues in a single task only. But, I had a problem, maybe how to get the ideas to create and repair the case studies. I also faced time constraints while preparing this case study".

In fact, if studied in depth, PBL can be used to coordinate the various subjects can be combined and taught or presented simultaneously. Through this approach, students continued to apply the content knowledge and skills in advance at the same time without depending on the lecturer to present and explain the content and skills. For

example, the syllabus content of the topic or subject can be combined with problem-solving skills or thinking skills.

Other student suggests:

> ''...although the lecturer sometimes had explained in detail what we had to do, it was not enough. This was the first time we had been exposed to the PBL approach in detail, before this we only heard what PBL was? If possible we need enough time to do the report...because we also need to do for other subjects as well!"

Clearly, this shows that students need more time to adapt the provisions of this rule. Provision should be appropriate and in accordance with the abilities of students. The lecturer involved in this study also suggested:

> "The students need quite a lot of time to solve the activities given. It's a pity for them because they complained that they have a lot of tasks for other subjects...but they said that they are interested and happy with the method. Only they didn't have much time. That's what they said..."

6.7 Lecturer's Views of PBL

The lecturer had a good impression towards the PBL implementation. The lecturer felt that students in PBL group became more responsible and actively involved in the learning process. Students used their mental and physical abilities in the PBL activities and students also gained intra personal and inter personal skills. However, this method still used the detailed and compact syllabus of Population Economics and Policy and it was more focused towards an assessment based on examination. The effect possibly could be that the involved lecturer/facilitator was forced to finish their syllabus. In addition, the implementation of the study was only during the semester (14 weeks) and this could be considered as quite short and could be considered a significant time constraint.

The lecturer involved also shared the suggestion that they need more training regarding the PBL implementation and process to make sure this approach could be implemented properly and effectively. The lecturer should also be given enough time so that they design or create the case studies to be used by the students. This would also enable the lecturer/facilitator to appreciate the implementation of the PBL method.

According to the lecturer involved, the students need to have an early preparation and a basic knowledge before the implementation of PBL. The students' thinking has a common perception and experience towards rote learning via the conventional approach. Therefore, in the early stage of PBL implementation, students take the time to suit themselves with this learning method. If this barrier can be avoided, probably a better result could be achieved.

Overall, with suitable and enough training for the lecturer and students, and also a relevant time allocation, PBL will become the best method in teaching and learning. PBL method also can be used to stimulate students' CT skills and actively involved in the learning process.

6.8   Summary of Discussion

In addressing the challenge of increasing the skills and knowledge, especially in the globalized world of the technology, teaching and learning methods required holistic approaches that can produce highly skilled graduates. In addition, the PEA3063 – Economics Population and Policy subject also involved the specific issues and current agenda of population in Malaysia and the world as general. The approach adopted and evaluated in the present study was PBL so that students could engage in substantial and meaningful interaction between group members or lecturer and tutor, and also between their own group and other groups within the wider class context. This section has discussed the effectiveness of PBL with Business Education students on Semester 1, 2010/2011 Session at the FPE, UPSI. The research findings showed that students showed a positive interest in the implementation of PBL in their teaching and learning. However, since no teaching and learning approach is perfect, there are

some shortcomings and challenges to be overcome in the process of teaching and learning using PBL.

This section also discussed in depth regarding the effectiveness of PBL pedagogy, in that it has improved students CT through CCTST instrument in many aspects especially their inductive and analysis subscales.

CHAPTER 7

CONCLUSIONS, IMPLICATIONS, AND RECOMMEDATIONS

7.1   Overview

The magnitude of the effect on CT skills, SDL, approaches to learning and preferences for different types of teaching identified in the study at FPE, UPSI, Malaysia implies that the findings have implications for research, knowledge, and understanding in this field, as well as implications for professional practice.

The last chapter concludes the study summarising the findings and discussing their implications. It begins with theory-based implications arising from the study that are relevant to professional practice, along with the implications to research and implications to knowledge and theories. It was follow with suggestions for future research. The section ends with conclusions that summarize the dissertation.

7.2   Theory-Based Implications

The findings of the present study indicate that activities designed using the PBL approach have a positive impact on the development of learning and thinking skills, especially on the students' CT skills. PBL activities or approaches would include the problem definition, the search for information or resources, implementation or implementing the solution, and the implementation of collaborative reflection with group members with the guidance and assistance of lecturers or facilitators.

It should be stressed that the students' CT skills and declarative knowledge acquired through the implementation of the PBL will be applied repeatedly. The problem solving activities are the main focus of teaching and learning through the PBL approach and this process is repeated. Through the PBL process which is being done repeatedly, it also can enhance and strengthen the higher order thinking and it becomes more effective with the frequent questioning of the problems by the lecturer

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or facilitator. This process, through its frequent occurrence, leads to the skills and knowledge being easily accessible and memorable, and so the information, new ideas and problem solving strategies can be stored in the student's long-term memory. This is an automatic process which is easy to be remembered and obtained if it needs to be used at any time.

7.3   Implications to research

There is still a lack of research in the Social Science area on the effect of PBL on the Malaysian education system. The PBL method has evolved in the Western countries especially in the United States, Canada, Netherland and Finland since the 1960's. The lack of research and studies related to PBL approach is certainly significant in Business Education. As discussed in the literature review, most of the PBL research in Malaysia is based on science and technology including the fields of medicine, nursing, engineering, biology, chemistry and physics. The lack of research based on the PBL approach also had an impact on the researchers involved. Any new PBL research and extension of existing PBL research should be expanded to include the use of experimental methods and case studies. In fact, the findings of this study should be taken seriously and extended to all courses in universities well as extended to the level of college education, secondary education and primary education.

The effectiveness of PBL also includes the affective effects that involved the stimulus and motivation for students to learn, the inculcation of students' self-directed learning and soft skills on interpersonal and intrapersonal dimensions such as communication, working in groups and thinking skills such as creativity should be emphasized and detailed in the PBL based research. The researcher would like to suggest that further studies should be on qualitative-based methodology, but attention should also be given on improving the quantitative research. This new research should be implemented in order to see in depth the effects of PBL on the subjects of the study, particularly in the comprehensive and holistic development of individuals. Also cross-border collaborations involving scientific knowledge combine technical expertise with social science will contribute to the production of new knowledge through joint research activities. This globalization era calls for intense competition

which should not be abandoned. However, we should not as mere followers, but as the leader or leaders who leading the changes. In this context, teaching and research for the construction of indigenous knowledge is very important and significant. This is because the local indigenous knowledge or knowledge-based economy will drive the next innovation to be the basis for positioning or mapping of Malaysia's in global ranking.

Assuming that the research would serve as a model or replicated in a new study, the researcher would like to stress and suggest the use of different tools or instruments. For example, the research for CT assessment and evaluation can be done using the WGCTA by Watson and Glaser (1980) and the CCTDI was also developed by Facione and Facione (1990). CCTDI is the premier tool for surveying the dispositional aspects of CT and it is a companion survey with the CCTST. The CCTDI measures the "willing" dimension in the expression "willing and able" to think critically. The CCTDI is designed for use with students in post secondary settings (undergraduate, graduate, and professional) and with adults outside of educational environments.

Similarly, the proposed further study should also focus on creativity or creative thinking and among the measurement instruments or tools that are used, or commonly used by researchers in this area would include the Creative Scientific Thinking (CST) (Weiping, 2002) and Torrance Test of Creative Thinking (TTCT) by Torrance (1990). In fact, we should encourage and propose the local academician or researchers to collaborate with the MOHE, Malaysia to develop our own thinking skills related research tool or test instrument that can be trusted and be more accurate in testing or assessing this skill based on the Malaysian mould and situation. In addition, the study related to the PBL should also apply the components of soft skills which had been introduced by MOHE at all the higher education institutions in Malaysia. Through this effort, it would be possible to measure the effectiveness of PBL in the implementation of the soft skills.

7.4　Implications to Knowledge and Theories

The Ministry of Higher of Education also need to streamline and develop the excellence of higher educational curriculum in Malaysia with the objectives to achieve greater support, flexibility and enrichment in order to achieve a transformation in various disciplines and programs at the universities. The curriculum should comprise the entire educational experience which has been designed for graduates and young people through their schooling, including their experience at the school level, college and further up to tertiary level. The findings of this research demonstrating the potential of PBL can be related to emerging ideas about the school and higher learning institution curriculum in different country such Singapore[1] and Scotland[2], as well as Malaysia. PBL can be applied to assist each student and graduate to develop the knowledge, skills and characteristics of learning for living and working. For example, there resonance with the four capacities which have been developed by Singapore and Scotland to enable each graduate or young person to become:

a)　a successful learners – able to use literacy, communication and numeracy skills; think creatively, critically and independently; learn independently and as part of group; make reasoned evaluations and; link and apply different kinds of learning in new situations.

b)　a confident individuals – able to relate to others and manage themselves; develop and communicate their own ideas and views of the world; assess risk and make informed decisions; and achieve success in different areas of activities.

c)　a responsible citizens – able to develop knowledge and understanding of the world and Malaysia's place in it; understand different ideas; make informed choices and decisions; develop informed; and ethical views of complex issues.

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[1] Source and adopted from Desired Outcome of Education, Ministry of Education Singapore, www.moe.gov.sg/education/desired-outcomes/

[2] see also, The purposes of the curriculum, Education Scotland, www.ltscotland.org.uk/understandingthecurriculum/whatiscurriculumforexcellence/thepurposeofthecurriculum/index.asp

d)   an effective contributors – able to communicate in different ways and in different settings; work in partnership and in teams; take the initiative and lead; apply CT in new contexts; create and develop; and solve problems.

This research also suggests that involving the four capacities can also create a valuable focus which would be useful for planning options and the next steps in learning. The properties and the performance can be strengthened, developed and used as a guideline to assess whether the curriculum for the graduate or any individual or young person is adequate to reflect or interpret the purpose of the curriculum. PBL could also be used to support the graduates in terms of developing their pre-vocational skills, to increase their initiative and employability, interpersonal skills, to upgrade the level of their cognitive skills and also to create opportunities of putting learning into the practical context and into their future lives.

This strong focus towards thinking skills is indeed important and every graduate should use this skill to get access to opportunities of learning and to become successful in their future. The confidence and efficiency in using their thinking skills provides the basis for lifelong learning. The authorities concerned at the various universities, learning institutions and Ministry of Higher of Education should explore and perhaps review and develop approaches for teaching and learning which are PBL based in the whole curriculum which are then applied together with thinking skills. Additionally, a relationship between theory in the lecture hall and application in the real workplace could be made in order to make the graduates see how the process relates to their studies and to further understand the contribution that they could make to the university, community and also for the benefit of the country. The graduates could also get involved and understand the importance of challenges and experience which could further enhance their potential, confidence and add positive value to their achievement.

The rapid development of science and technology has indeed created a great impact on the economic, social and cultural society in Malaysia. These changes have also affected the country's education system. These factors also change the shape and the skills required for a particular job. A quality and excellent education system which

emphasizes on a balance of intellectual and moral aspects is indispensable to pave the path towards achieving an excellent and civilized society. A quality education system which is able to cope with the increasingly complex challenges of the 21st century can only be achieved with careful planning, strategic efforts and cooperation from all parties.

In line with this, the Business Education curriculum also needs to change to meet the human developmental needs in order to enable Business Education students to have sufficient quality to compete in this competitive era. The policy in the Business Education system also emphasizes the principle of balance in life. This principle is geared towards producing students who are not only focused on the intellectual aspects but also other aspects such as the spiritual aspects. The principles of accuracy and honesty are emphasized in the Business Education but this is also consistent with the certain principles outlined in the Al-Quran where ALLAH (God) asserts:

> "…and observe the weight with equity and do not make the
> balance deficient" (Al-Quran; Al-Rahman, 9)

Besides being trained in business aspects, the Business Education students also should have the skills to think creatively, to be intellectually critical and to have strong moral characteristics. The effort to produce individuals who are balanced and competitive is outlined in Malaysia's Vision 2020 and National Mission. In this regard, changing the students' mindset towards a more positive and successful attitude should be generated from the beginning of the education system. One of the objectives in Vision 2020 is to equip each individual from all angles, from the aspect of high-technology based knowledge to the spiritual development; to meet the government's intention to produce a civilized society born from a fertile social system based on moral principles and thinking skills which guarantee a balance between the individual and society.

National Mission is a framework of the national development agenda which sets the five core focused on the key areas that would bring nation to achieve Vision 2020 (Abdullah, 2006). The second thrust of the National Mission involve efforts to improve the overall education system from the pre-school to the high-level and vocational as well as creating an environment to encourage research and development.

Concurrently emphasis will be placed on nurturing a cultured society with a moral force but remaining critical. Individuals who possess critical, creative and high moral values are humble individuals with a greater awareness of their responsibility for themselves, the society and the nation.

The nation is currently facing a new millennium challenge in the form of a global knowledge explosion as well as the students' weakness in analysis and analytical skills which need to be addressed immediately. As such, the important agenda for human development is through the education system by cultivating a knowledge society. In this regard, all parties need to cultivate in their minds that education is a continuous process of human life. Knowledge is the most significant aspect in determining the survival of civilization and excellence. Fostering a culture of knowledge that places the highest value to knowledge will help to build a creative and critical mind as well as providing the key to racial and religious excellence. This is in line with research findings when students can provide and experience themselves with challenging world, systematically and high order thinking skills, and more focused to the current issues

Thus the educators need to become wise in using an approach of implementing critical skills across the curriculum to help develop a civilized society among the students with the below characteristics; information-savvy, with sound mental capabilities, noble values and morals, sense of personal identity and entrepreneurship success. Additionally, educators should have excellent personal qualities, and equip themselves with adequate knowledge and skills to provide the best education to students. The educator with outstanding personal qualities is also known as a Smart Teacher (Guru Bestari) who is able to balance the needs, challenges and the demands of the National Education Philosophy, Vision 2020 and National Mission. As stressed by Wan Mohd Zahid (1994), the field of education requires skilled educators, who are able to filter, blend and mould each item in line with the resistance level of the nation's citizens and culture and contribute towards strengthening the basic existence of the nation. As such, educators of Business Education courses are responsible for their students, the society in general as well as themselves in order to produce managers, administrators, businessmen, financial managers, auditors and others

professionals with CT skills and creativity as envisioned by the state, religion and nation.

We can also assume that the idea of expressing one's views in the classroom or lecture hall has radically changed since a few years back. The assumption that the classroom or lecture hall is usually a quiet place is connected to the idea of something positive or even a successful outcome in teaching and learning. Indeed, the teaching and learning process is effective if the student gets the opportunity to think and discuss together with his or her classmates, to think about certain ideas, questions, to analyze and solve problems without the permanent medium of the teacher. This effect from Lev Vygotsky's idea or concept shows that PBL and CT skills play a role in creating an effective teaching and learning process. Through this approach, we promote the idea that students, including those in higher institutions of learning, show an effectve increase especially in student's academic achievement and soft skills such as communication, working in group and thinking skills when they get the chance to study with one another.

The PBL approach would also support the students in developing various skills which would be useful in their daily work as the soft skills component would also comprise thinking skills. Furthermore, PBL also gives an effect on vocational, initiative and marketable skills. The living skills and working skills have been embedded in all curriculum fields and this includes the type of learning included in the general term 'vocational'; the students who are learning about pre-vocational and marketable development skills which would be useful in their future. Through the PBL approach which creates a relationship between the class or the lecture hall with the current situation or current workplace, the students would be able to see the link between what they are studying and the contribution they can make to their institution of learning, the community as well as to the nation's economy. Through this approach, they can also experience the importance and the challenge of acquiring satisfaction and this can potentially increase their confidence positively towards their achievement level.

Through PBL as stated by Smith (2005), and according to the findings of this study, students also get the chance to:

a)   develop their knowledge and understanding about the real life situation, including the workplace reality when they finish their studies.

b)   acquire the experience and the culture to work and show their effort through PBL activities.

c)   get the access to specific opportunities for learning through coursework skills or case studies as well as group discussion, finally

d)   to enable the students to develop their skills, confidence and ability to become future graduates, workers, managers, employers and leaders.

7.5   Implication for Professional Practice

In this study, the researcher is a lecturer in the Faculty in the study and therefore had a position in a group of intervention before taking on the role of observer. In this matter, I could be viewed as the students' monitoring-participant. Additionally, I did not take part in or solely teach any of the participants before, and in that sense I was a neutral-observer in all PEA3063 – Economics Populations and Policy lectures or tutorials. According to Eisner (1993), the researcher's role is to listen, look and record group behaviours and interactions as objectively as possible for later analysis. This is what I aimed to do through class monitored, as explained in detail previously (4.6.1). In this section, I will discuss some of my reflections and observations collected through class monitoring, and relevant implications.

Through the monitoring of the PBL and TL groups, I found that the PBL students were generally more active in learning. Most of them were directly involved in asking the lecturer questions, they appeared confident enough to argue and explain the problem or provide suggestions to other group members. The PBL students appeared to be generally confident to communicate with others, and to enjoy working while in groups.   This was contrasted with what I found happening in the traditional group,

where the students were working more independent of each other (on their own) and concentrated more on the whiteboard or display screen for copying the notes and explanations provided by the lecturer. Although they also showed interest in the lecturer explanation, this appeared to be less profound compared to the PBL group. They would only respond when questioned by the lecturer. They also seemed to be less interactive, and less communicative when working in teams. This observations emerging from my class monitoring, are also reflected by the lecturer when he stated that: "PBL is more focused on students'...encourages the students to use thinking skills in the learning process...and it is more effective to study either individually or in groups. This does not usually happen in TL". This is in line with the study findings by Bernstein et al. (1995), when they found that PBL increase in student comments concerning the advantages of PBL after their learning experience.

Additionally, the TL groups showed little inter-group tension, with students chatting and laughing about their social activities. The PBL groups displayed some limited intra-group tension and arguments, and a number of students it seemed to be helpless in the face of difficult problems, with one student expressing the opinion that the group climate did not facilitate the learning process. Another student suggested the following: "Not sure what to do at first stage...We had to discuss in group. In this way, we know what to do and what to answer. This was a challenge to us!". Tensions between members and dysfunctional PBL groups have been noted in a numbers of studies (Hitchcock & Anderson, 1997; De Grave et al., 2001; Hendry et al., 2003).

In terms of monitoring the students in terms of their class behavior, class monitoring revealed some differences between the PBL and TL groups. A large proportion of the TL students' time and activities was spent 'off-task' (evidence based on class observation and monitoring such as surfing the web, interacting with their social networks, chatting with others, laughing etc) while the students in PBL group were more focused on PEA3063 – Population Economics and Policy problem solving. This raises issues around how the lecturer managed the activities with the TL class. The TL group seemed to enjoy their time in the lectures and tutorials (students showed little intra-group tension, with students chatting and laughing about their social activities) although they got insufficient class time to discuss their assignments.

It was also noted that the PBL group asked for less direct assistance from the lecturer than the TL group, as revealed by the class monitoring. The lecturer in the TL group spent a significant amount of time answering the problems regarding the individual and group assignments. Class monitoring also revealed that in the PBL group this was completely reversed, as the students focused on searching materials, analysis and discussion to solve the problem given. This is related to findings from previous studies that PBL increases and enhances the learners' ability to analyse and solve the problem (Duch et al., 2001; Hmelo-Silver, 2004; Torp & Sage, 2002).

Based on these observations and class monitoring over the 14 weeks intervention period, the lecturer involved in conducting the PBL approach appeared to be under pressure. He felt an additional workload as necessary to provide a case study or the PBL problem, to communicate or engage sufficiently with the PBL group members when they are in the process of solving the problems presented, and to attend related training before the start of the intervention. This is indicated by some of the comments he made on questionnaire;

> "... PBL is believed to be an effective approach to prepare students
> with a positive characteristic. But to me, in the first time involved
> in conducting this class, the workload had increase. I need to
> provided materials, I always have to be ready when students do not
> understand...which the research and administration work. This
> does not the platform to encouraged students to attend the training
> and to understand how to make the PBL is interesting. However, I
> am confident PBL able to produce versatile students who are with
> the wishes of MOHE ".

This finding is consistent with findings from Berkson (1993) stated that the most common complaint from faculty members is that of competing academic expectations and time commitments. Kinnunen and Malmi (2005) suggest that the tutor needs proper knowledge of and training in how to guide a group when needed. The traditional group monitoring showed the lecturer was comfortable, confident and relaxed when handling a class lecture, and was engaged in preparation of the lecture

and teaching aid materials, as he had prior experience in teaching the same subject for several semesters.

In addition, some research suggests that that the lecturer and those involved in PBL require essential skills during providing and solving the problems in the PBL cases (Ali & Abdul Kader, 2005). If the problems produced by a lecturer were clear and well planned, it would help and facilitate students to getting relevant ideas or information w and subsequently this would help the students in generating the best solutions. On the other side, lecturers should master their knowledge about CT before becoming associated with PBL so that they can apply and engage students to think critically in any intellectual task such as choosing a possible option or making a judgment. This is line with Beyer (1991) who suggested that to master any skill, including CT skills, it should be over learned at the early stage. Within the process to mastery CT skills, the lecturer should also be able to explore the five types of intellectual resources which were developed and suggested by Case (2005) (see p. 61-62 for a description).

The students should also be provided with the problems in advance to enable them to understand it before becoming involved directly in the discussion. When adopting this approach, students should be supported to schedule daily study plans. The student in the PBL approach should also be free to attempt cases or other problems does before the course begins to enable them to familiarize themselves with the PBL approach.

The students also need to be encouraged and motivated to be actively involved in all activities. A lecturer in charge need to provide a comprehensive guide for which every PBL group activity and the students should be actively involved in the PBL activities. The approach or schemes of the measurement and evaluation has to take into consideration active involvement of students. This is in line with the ideas presented by Kinnunen and Malmi (2005), in which without the measurement and evaluation of students' active involvement in the discussions will cause problems when the weak or lazy students simply become a passive passenger in a group discussions. Accordingly, the membership in a PBL group should be homogeneous in terms of academic achievement, knowledge and skills. Based on observations by the

researcher, this approach is also in accordance with the recommendations of Kinnunen and Malmi (2005). Where student are relatively weak in terms of performance, knowledge or skills they will work hard and discuss among themselves to solve the problems presented. In a PBL groups it is necessary to have such terms or guidelines to prevent any member who simply becomes a passenger.

Presently, based on the search through the literature reviews and the findings of this study, the researcher believed this is the first study related to the effectiveness of the PBL implementation and integrated with Business Education at doctorate level in Malaysia. It is also believed that the study is a new dimension and presents a pioneering use of PBL as an approach to teaching and learning in Business Education in the world scale. Based on this assumption, the research and the results of this study to take the lead as a reference and guideline for the implementation and the effectiveness of PBL approach in related studies on student's CT skills and can be integrated into Business Education. The researcher is confident that there still exists a huge space and vast opportunities in adopting a PBL approach in Malaysia through the government's views and plans to produce a highly skilled manpower with creative and critical ideas.

7.6   Recommendations

The study has discussed and suggested that PBL can be implemented in Malaysian universities especially in the Business Education courses. At this stage, the students have been prepared and experienced with the PBL method and they already have a self-directed learning skill. However, the implementation of the PBL approach in Malaysian universities requires careful consideration and should be done with rather detailed preparation. As arising from the open-ended questions exploring their perceptions about PBL, students should have enough training regarding the PBL tasks, how to search for the right and accurate information and working within groups to solve the given problems. As for the lecturer, they also require proper training to assist the PBL class, how to prepare good PBL tasks s which are related to syllabus contents. PBL tasks or assignments should be in line with the student's knowledge and their study level.

PBL is based on the learning principles such as self-directed learning, cumulative learning, learning through experience, learning by focus, reflection and problem centered learning, and considerations of the relationship between knowledge and skills. Therefore, the university students should be trained and further supported on how to learn in their own way or capacity and not to always depend on the lecturer's input. The PBL elements and tasks should be prepared in such a way so that the implementation of PBL can enable the implementation of an effective and holistic education for Malaysian universities graduates. Based on the findings of this study, the researcher supports the idea that the implementation of PBL can have a positive effect towards graduate CT skills and the understanding of content knowledge. This is supported for at least some of the CT constructs through CCTST (Inductive and Analysis), but not overall. The effective and holistic teaching and learning through PBL method can be classified as: the types of problem in PBL; time allocation; traning for lecturer and students; materials and facilities to implement the PBL method; and assessment and evaluation.

7.6.1 The types of problem in PBL

The study suggests that the problems presented should be authentic, based on current and daily issues regarding economics population and policy. It becomes more reliable if the student has an experience in their daily situation and life and is related to the Malaysian context or worldwide. This type of problem-tasks is of greater importance and is more meaningful to the students and therefore more relevant to learning, as it can be implemented. The problem task should start from easy to difficult and be suitable to students' ability and achievement level.

The researcher suggests that the implementation of PBL method might also be suitable for other subjects. It has also been suggested that future studies should be examined to identify the critical factors regarding PBL to determine the exact features of the approach which would be the key to uncover the benefits and how the features relate to collaborative learning as it involves the working group. This is for assessing whether PBL is not only useful to produce students who are able to think critically but also to prove and portray that PBL can also produce meaningful learning.

In addition, the proposed research should include and cover the critical factors related to PBL and its relationship to collaborative learning including working group activities. I propose a collaborative dimensions framework to promote more active learning engagement by students in their own learning and promote the development of self learning skills so that students can deal with new information rather than only relying on lecturers, emphasizing the role of lecturers and students as learners who benefit from teaching and learning one another, and create opportunities to develop group and higher order interpersonal skills. This is to assess whether PBL not only produce students who can think critically, but also to show and proved that PBL can bring about meaningful learning.

7.6.2 Time allocation

Related to the time allocation, there are considerations and suggestion for both the tutor and the students.

7.6.2.1 Time and Tutor

The lecturer involved in the implementation of the PBL can use the distribution of lecture and tutorial period which are usually three hours (depending on the credit hours for the subject) by presenting the problems to students based on the allocation time for it. The involved lecturer should carefully plan the problems and issues to be submitted preferably as brief and concise. The problems also must meet the needs of the time, topics and requirements of the syllabus.

7.6.2.2 Time and students

The problems presented to students should have a time limit or provisions to be resolved. Without this approach, students are likely to remain weak or complacent in the efficient management in the success of PBL methodology.

7.6.3   Training for lecturer and students

As we can see, the role of training both tutors and students in PBL has come up in various comments from the participants so far, possibly illustrating its importance. Results from the PBL study were generally positive but at the same time the teachers and the students did face some difficulties. During the time of the implementation, the regular teaching programme was also on-going. As such, there was a problem in finding vacant classrooms as well as staff who had mastered the PBL method. The PBL students were also unsure about how much studying they had to do and what type of information was relevant in certain scenarios. This was especially apparent in the economics abstracts concepts and population subject. Additionally, the students in the PBL group also asked for more guidance from their lecturer than the students in the control group (as anticipated).

Although most of the lecturers involved in the teaching and learning process at the university are equipped with skills in curriculum, pedagogy, assessment and measurement, they need further support in order to implementing the PBL method successfully. The lecturer need more training in preparing, building and creating questions based on PBL which would be suitable with the topic to be given to the students. According to Karakas (2008), the training should also involve a collaborative learning approach. The training and skills should be originally mastered by the lecturers who will apply the PBL approach before the approach can be effective for group activities.

The lecturer involved also must be have an exposure and experienced to meta-cognition, reflection and knowledge skills to assist students in the PBL approach. Indirectly, the lecturers who will be using the PBL approach should also have the mental strength (Cheong, 2008) when implementing the student's paradigm shift from the rote-learning to CT based learning. This approach is actually more focused on the development of positive student's CT and not only based on student assessment through examinations. In appreciating the PBL approach, the lecturers involved should be in line with the idea that they will teach their students but they will also learn from the students while implementing the PBL method. There seems to be some sort of norm and taboo in the Malaysian education system since Malaysia's

independence in 1957, whereby teachers and educators command the greatest respect from the students, who in turn are expected hear and obey all instructions from their teachers. Normally, teaching and learning is more than rote-learning or one way instruction. Students do not usually present their views or ideas to the teacher in the class, particularly in the school system. This becomes the norm for most students who continue with the attitude until higher education. Accordingly, students in Malaysia should be encouraged to put forward their views and suggestions. In fact, educators or teachers also need to be open to receive views and ideas from their students.

Besides the training for the lecturer, the students involved in the PBL implementation should also be exposed to basic training in the PBL implementation. The training could begin by including certain elements and short explanation about the concepts and strategies needed in PBL since the students' early level in the university. In the beginning perhaps the element could be included in an informal manner into the subject syllabus. Then the students could slowly be exposed to detailed PBL implementation. Through this approach, it is hoped that the students could be exposed to and comprehend a more serious PBL implementation.

7.6.4   Materials and facilities to implement the PBL method

The reference materials comprising the reference books, guide books, journals and working papers related to PBL should be increased in the university library collection (UPSI, 2008). Online references are also very important. To achieve the effectiveness of this implementation, facilities should be revised and improved in terms of the quality. Proposals of titles should be solicited and sources of information need to be purchased and built from the lecturers, the management and library customers. Other suggestions would include building and developing collections to support university learning and teaching, and research include teaching methods: PBL, project-based learning, experiential learning, cooperative learning, case-based learning, role play and simulations, contextual learning and other methods. Upgrading the level of facilities in Malaysian universities appears to be a considerable task however every year higher education gets top priority from the Malaysian government in terms of the

annual budget. Most of the Malaysian universities have been equipped with some of the best possible infrastructure, including and the latest Wi-Fi and broadband facilities. Universities should improve learning facilities in line with the developments in teaching methods through the upgrading of the library media resource room as an e-learning resources for access to online media resources, planned digitization university graduate theses and doctorates that are easily accessible and also increase the number of computers for the Online Public Access Catalogue (OPAC) to facilitate the search for library information. The investment by the government may be viewed by some as extensive, but it is hoped that the long-term benefits will outweigh the investment in developing highly competent graduates and human resource energy.

7.6.5   Assessment and evaluation system

The changes need to be implemented and done to ensure the effectiveness of PBL in educational system especially at the tertiary level. The changes included the aspects of assessment and measurement. Through the implementation of PBL, the student's assessment and measurement not only in terms of existing knowledge, in fact, it should cover the skills and their abilities to solve and overcome the problems. Thinking skills, communication and relationship skills also can be implemented through the PBL approach. Through the using of special assessment and measurement methods, we will be able to determine the student attitude, ability, motivation and self-efficacy. The PBL approach is thought to effectively monitor the student development in teaching and learning.

7.7   Conclusions

The study showed that the implementation of CT skills in the teaching of Business Education through PBL is still at a low level. Views, problems and constraints faced by students and lecturers in this field have an influence on the effective implementation of the CT skills in teaching PEA3063 – Population Economics and Policy. In addition, the lecturers of the participating subjects in the study need encouragement and the support from the relevant parties such as the MOHE, universities, colleagues, the media and the parents in delivering specific incentives to ensure its success in the development process of CT skills amongst the students.

Finding of this study are expected to contribute knowledge and information which is meaningful for dealing with problems that exist in the Business Education curriculum at universities in Malaysia today. The findings could be used as sources of information for improving the effectiveness of the Business Education curriculum and teaching and learning process of Business Education lecturers. The related parties may use the information gained to improve the national education system in producing quality graduates with a first-class thinking as envisaged in the 10^{th} Malaysia Plan and achieving the developed nation status in line with Vision 2020. Additionally, some further proposals have been submitted for future studies to equip the data collected and to contribute to human development, especially in the quality human beings, an excellent, balanced and first class engaged in Business Education profession in Malaysia.

The student's development as a balanced and successful human being should start from a quality and effective education system. The ability to achieve the National Education Philosophy (1996) depends on the ability of the implementing agents and lecturers to provide an excellent educational process. The knowledge, skills, commitment and motivation of lecturers are the key to the success of the implementation process of PBL in order to improve CT skills in students. In carrying out the application of thinking skills in teaching, Business Education lecturers must have knowledge and skills to diversify methods of instruction and approaches to the implementation of CT skills used to inculcate this skill effectively to students. Therefore, lecturers should have adequate training and knowledge to enable them to

provide effective instruction. CT skills methods and approaches which are applied in teaching should be adapted to the topics being taught, the level of student ability and thought which is applied to the elements. Students should be given guidance on CT skills which are internalized, held and practiced throughout their life, particularly in career and decision making. Additionally, the students had the advantage and opportunity to improve their interpersonal and intrapersonal communication skills, and also how they might deliver their own opinions and judgments effectively. These are important characteristics for life in modern's challenging world.

All graduates could benefit from this learning method and it should be reflected in every curriculum of program and courses. This plan should also involve all academicians to make sure that each activity designed using PBL approaches is not treated in a casual or too compact manner, but part of the implementation as a coherent whole.

> It is the intention to advance the work done in the study to promote Business Education at the tertiary level in Malaysia to develop and encourage the students' intellectual and specifically their thinking skills. These students in the future would have to meet the demand of nation and employers for competent economists, entrepreneurs and educationists and the standard of the service provided would reflect in part the educationalists' ability to prepare their students adequately to meet the demands.

References

Achuonye, K. A. (2010). A comparative study of problem-based and lecture based learning in secondary school students' motivation to learn science. International Journal of Science and Technology Education Research, 1(6), 126-131.

Alavi, C. (1995). Problem-based Learning in a Health Sciences Curriculum, Routledge: London.

Albanese, M. (2000). Problem-based learning: Why curricula are likely to show little effect on knowledge and clinical skills. Medical Education, 34 (9), 729-738.

Ali, Bashiran & Abdul Kader, Sharifah Zubaidah (2005). PBL: Impact on Communication Skills For Law Students. International Conference on Problem-Based Learning: PBL in Context – Bridging Work and Education, June 9-11, Lahti, Finland. Retrieved on Mac 15, 2013 from http://www.lpt.fi/pblconference/full_papers/11_full_papers.htm

American Philosophical Association (1990). Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction, ("The Delphi Report"). ERIC Doc. No. ED315-423, p.80.

Armstrong, E. G. (1991). A hybrid model of problem-based learning. In D. Boud & G. Feletti (Eds.), The challenge of problem-based learning pp. 137-149). London: Kogan Page.

Angel, B.F., Duffey, M., & Belyea, M. (2000). An evidence-based project for evaluating strategies to improve knowledge acquisition and critical-thinking performance in nursing students. Journal of Nursing Education, 39(5), 219-228.

Ausubel, D. P. (1963). Cognitive structure and the facilitation of meaningful verbal learning. Journal of Teacher Education, 14, 217-222.

Awang, H., & Ramly, I. (2008). Thinking skill approach through problem-based learning: Pedagogy and practice in the engineering classroom. International Journal of Social Sciences, 3(1), 18-23.

Babbie, E. (1990). Survey research methods (2nd ed.). In J. W. Creswell (Eds.). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (p. 12). London: Sage Publications, Inc.

Badawi, A., A. (2007, speech). National Education Blueprint 2006-2010. Putrajaya: Putrajaya International Convention Centre.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice- Hall, Inc.

Banning, M. (2005). Approaches to teaching: Current opinions and related research. Nurse Education Today, 25, 502-508.

Banta, T., Black, K. & Kline, K. (2002). Evidence for and against problem-bases learning, Newsletter for undergraduate problem-based learning, Stamford University, 3 (3), 1-7.

Barret, T. (2009). What can we learn about learning from how problem-based learning students talked about it in PBL tutorials? Invited Speaker will present in 2[nd] International PBL Symposium. Singapore: Republic Polytechnic, 10-12 June. Retrieved January 10, 2009, from http://www.rp.sg/symposium/2009/abstract_barret.asp

Barrows, H. S. (1990, May). Problem-based instruction. Presentation at the Illinois Mathematics and Science Academy Problem-based Learning Conference, Aurora, Illinois.

Barrows, H. S. (1997). Problem-based learning is more than just learning around problems. The Problem Log, Spring (2), 4-5.

Barrows, H. S., & Tamblyn, R. M. (1980). Problem-based learning: An approach to medical education. New York: Springer.

Bell, J. (1993). Doing your research project. A guide for first-time researched in Education and Social Science (2[nd] ed.). Milton Keynes, Eangland: Open University Press.

Berkson, L. (1993). Problem-based learning: Have the expectations been met? Academic Medicine, 68, S79-S88.

Bernstein, P., Tipping, J., Bercovitz , K. & Skinner, H. A. (1995). Shifting students and faculty to a PBL curriculum: Attitudes changes and lessons learned. Academic Medicine, 70(3), 245-247.

Beyer, B. K. (1987). Practical strategies for the teaching of thinking, Boston: Allyn and Bacon.

Beyer, B. K. (1991). Teaching thinking skills: A handbook for secondary school teachers. Boston: Allyn and Bacon.

Beyer, B. K. (1995). Critical thinking. Bloomington, IN: Phi Delta Kappa Educational Foundation.

Bigelow, J. (2004). Using problem-based learning to develop skills in solving unstructured problems. Journal of Management Education, 28, 591-609.

Biggs, J. (2003). Teaching for quality learning at university. Berkshire, UK: Open University Press.

Bonwell, C. C., & Eison, J. A. (1991). Active learning: Creating excitement in the classroom. Washington, DC: ASHE-ERIC Higher Education Report No. 1.

Borg, W. R., & Gall, M. D. (1989). Educational research. New York: Longman.

Boud, D., & Feletti, G. I. (1991). The challenge of problem-based learning. London: Kogan Page.

Boud, D., & Feletti, G. I. (Eds). (1994). The challenge of problem-based learning. Araya, D (2003, Winter). Application of Problem-Based Learning in Accounting. The Accounting Educator, The Newsletter of the Teaching and Curriculum Section of AAA, XII (2), University of Dewalare. Retrieved March 4, 2010 from www.udel.edu/~debessay/Application%20of%20PBL in_Acctg_Edu.doc

Boud, D., & Feletti, G. I. (Eds.). (1997). The challenge of problem-based learning (2nd ed.). London: Kogan Page.

Biley, F. (1999). Creating tension: Undergraduate student nurses responses to a Problem-Based Learning curriculum. Nurse Education Today, 19(8), 586-591.

Blumberg, P. (2000). Evaluating the evidence that problem-based learners are self-directed learners: A review of the literature. In D. H. Evensen & C. E. Hmelo (Eds.), Problem-based Learning: A research perspective on learning interactions (pp. 199-226). Mahwah, NJ: Lawrence Erlbaum.

Bogdan, Robert, C. & Biklen, Sari, K. (1982). Qualitative research for education: An introduction to theory and methods. Boston: Allyn & Bacon.

Boshuizen, H.P.A., Schmidt, H.G. and Wassamer, I. (1990). Curriculum style and the integration of biomedical and clinical knowledge. Paper presented at the 2nd International Symposium on Problem-based Learning, Yokyakarta, Indonesia.

Bridges, E. & Hallinger, P. (1997). Using problem-based learning to prepare educational leaders. Peabody Journal of Education, 72(2), 131-146. Retrieved September 12, 2011, from http://www.philiphallinger.com/papers/pbl/PBL_prepare_school_leaders_PJE.pdf

Brooks, M. G., & Brooks, J. G. (1999). The courage to be constructivist. Educational Leadership, 57(3), 18-24.

Brooks, K., & Shepherd, J. (1990). The relationship between clinical decision-making skills in nursing and general critical thinking abilities of senior nursing students in four types of nursing programs. Journal of Nursing Education, 29(4), 391-399.

Brownell, J. & Jameson, D. A. (2004). Problem-Based Learning in Graduate Management Education: An Integrative Model and Interdisciplinary Application, Journal of Management Education, 28 (5), 558-577. Retrieved December 12, 2008, from http://jme.sagepub.com/cgi/content/abstract/28/5/558

Bruner, J. S. (1996). The culture of education. Harvard Univesity Press, Cambridge.

Burch, K. (2001). PBL, Politics, and Democracy. In B. J. Duch, S. E.. Groh & D. E. Allen (Eds), The power of problem-based learning: A practical "How To" for teaching undergraduate courses in any disciplines (pp.193-205). Sterling, Virginia: Stylus Publishing, LLC.

Burns, R. (2000). Introduction to Research Methods. London; Sage Publication.

Burris, S. (2005). Effect of Problem-Based Learning on Critical Thinking Ability and Content Knowledge of Secondary Agriculture. Unpublished PhD Dissertation. University of Missouri-Columbia, USA.

Camp, G. (1996). Problem-based learning: A paradigm shift or a passing fad? Medical Education, 1(2), 1-6.

Campbell, D., & Stanley, J. (1963). Experimental and quasi-experimental designs for research. In N. L. Gage (Eds.), Handbook of research on teaching (pp. 1-76). Chicago: Rand McNally.

Carter, D. E. & Porter, S. (2000). Validity and reliability. In Cormack D (eds). The Research Process in Nursing (4th Eds.) (pp. 29-42). Oxford, Blackwell Science.

Case, R. (2005, Spring). Education Canada, 45(2), 45-49. Retrieved May 9, 2012 from http://www.ubc.ca/okanagan/ctl/__shared/assets/ct-mainstage595.pdf

Cepni, S., & Keles, E. (2006). Turkish students' conceptions about simple electric circuits. International Journal of Science and Mathematic Education, 4, 269-291.

Chan, K.G. (2000). PBL@Anderson. Problem-based learning: Educational innovation across disciplines. The 2nd Asia Pacific Conference on PBL, Temasek Polytechnic, Singapore. Retrieved November 2, 2008, from http://pbl.tp.edu.sg/PBL-resources/articles/understandingPBL/ChanKhahGek.pdf

Charlin, B.; Mann, K. & Hansen, P. (1998). "The Many Faces of Problem-Based Learning: A Framework for Understanding and Comparison". Medical Teacher, 20 (4), 323-330.

Clarke, J. H. (1990). Patterns of thinking: Integrating learning skills in content teaching. Boston: Allyn & Bacon.

Colliver, J. A. (2000, March). Effectiveness of Problem-Based Learning Curricula: Research and Theory. Academic Medicine, 75(3), 259-266.

Carter, D. E. & Porter, S. (2000). Validity and reliability. In Cormack D (eds). The Research Process in Nursing (4[th] Eds.) (pp. 29-42). Oxford, Blackwell Science.

Cheong, F. (2008). Using a Problem-Based Learning Approach to Teach an Intelligent Systems Course. Journal of Information Technology Education, 7, 47-60. Retrieved Mac 30, 2010 from
http://www.jite.org/documents/Vol7/JITEv7p047-060Cheong.pdf

Chin, C. & Chia L.G. (2000). Implementing PBL in biology. Problem-based learning: Educational innovation across disciplines. The 2[nd] Asia Pacific Conference on PBL, Temasek Polytechnic, Singapore. Retrieved November 22, 2008, from http://pbl.tp.edu.sg/PBL-resources/articles/PBLSubjects/ChristineChinLiGekChia.pdf

Choi, H. (2004). The effects of PBL (Problem-Based Learning) on the metacognition, critical thinking, and problem solving process of nursing students. Journal of Korean Academic Nursing, 34 (5), 712-721. Retrieved November 22, 2010, from
http://www.koreamed.org/SearchBasic.php?RID=1006JKAN/2004.34.5.712&DT=1

Clarke, J. H. (1990). Patterns of thinking: Integrating learning skills in content teaching. Boston: Allyn & Bacon.

Cohen, J. (1977). Statistical power analysis for the behavioral sciences (revised ed.). New York: Academic Press.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2[nd] ed.). Hillsdale, NJ: Erlbaum.

Coker, P. (Winter, 2010). Effects of an experiential learning program on the clinical reasoning and critical thinking skills of occupational therapy students. Journal of Allied Health, 39 (4), 280-6. Retrieved November 22, 2010, from
http://www.ncbi.nlm.nih.gov/pubmed/21184024

Colliver, J. (2000). Effectiveness of problem-based learning curricula: research and theory. Academic Medicine, 75 (3), 259-66.

Cook, P., Johnson, R., Moore, P., Myers, P., Pauly, S., Pendarvis, F., Prus, J., Ulmer-Sottong, L. (1996). Critical thinking assessment: Measuring a moving target. Report and recommendations of the South Carolina Higher Education Assessment Network Critical Thinking Task Force. Rock Hill. SC: South Carolina Educational Assessment Network. (ERIC document reproduction service No ED413 808)

Coombs, G. & Elden, M. (2004). Introduction to the Special Issue: Problem-Based Learning as Social Inquiry – PBL and Management Education. Journal of Management Education 28, 523-535.

Cooper, J. O., Heron, T. E., & Heward, W. L. (1987). Applied behaviour analysis. In J. W. Creswell (Eds.). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (Eds) (p. 12). London: Sage Publications, Inc.

Creswell, J. W. (2007). Qualitative inquiry and research design: Choosing among five traditions (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2009). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (3rd ed.). London: Sage Publications, Inc.

Critchley, B. (2011). Critical thinking in Business Education. Investigation in University Teaching and Learning, 7 (Spring), 5-15.

Davis, M. H., & Harden, R. M. (1999). The Association for Medical Education in Europe (AMEE) medical education guide No.15: Problem-based learning: A practical guide. Medical Teacher, 21(2), 130-140. doi:10.1080/01421599979743

D'Antoni, A. V., Zipp, G. P., Olson, V.G. & Cahill, T. F. (2010). Does the mind map learning strategy facilitate information retrieval and critical thinking in medical students. BMC Medical Education, 16, 10-61. Retrieved November 22, 2011, from http://www.biomedcentral.com/1472-6920/10/61

DeCarvalho, R. (1991). The humanistic paradigm in education. The Humanistic Psychologist, 19(1), 88-104.

De Graaff, E., & Kolmos, A., (2003), Characteristics of problem-based learning. International Journal of Engineering Education, 19(5), 8.

Dehkordi, A.H. and Heydarnejad, M.S. (2008). "The impact of Problem Based Learning and lecturing on the behaviour and attitudes of Iranian nursing students". Danish Medical Bulletin, 55(4), 224-226.

De Corte, E. (2000). Marrying theory building and the improvement of school practice. Learning and Instruction, 10, 249 - 266.

De Corte, E., Verschaffel, L., Entwistle, N. J., & van Merrienboer, J. (Eds.) (in press) Powerful learning environments: Unravelling basic components and dimensions. Oxford: Elsevier Science

De Graaff, E., & Kolmos, A., (2003). Characteristics of problem-based learning. International Journal of Engineering Education, 19(5), 8.

De Grave, W. S., Boshuizen, H. P. A., & Schmidt, H. G. (1996). Problem-based learning: Cognitive and metacognitive processes during problem analysis. Instructional Science, 24, 321-341.

De Grave, W. S., Dolmans, D. H. J. M., & van der Vleuten, C. P. M. (2001). Student perceptions about the occurrence of critical incidents in tutorial groups. Medical Teacher 23(1), 49-54.

Delisle, R. (1997), How to use problem-based learning in the classroom. Association for Supervision and Curriculum Development. Alexandria, VA, USA.

Dewey, J. (1910). How We Think (republication 1997). Dover Publications, Inc.: Mineola, New York.

Dewey, J. (1916). Democracy and Education. The Free Press: New York.

Dewey, J. (1944). Democracy and Education: An Introduction to the Philosophy of Education. New York: The Free Press.

Dimsdale, T & Kutner, M. (2004, December). Becoming an educated consumer of research: A quick look at the basics of research methodologies and design. Meeting of the Minds Practitioner-Researcher Symposium: American Institutes for Research. Retrieved November 22, 2009, from http://www.air.org

Dochy, F., Segers, M., Van den Bossche, P., & Gigbels, D. (2003). Effects of problem-based learning: A meta-analysis. Learning and Instruction, 13, 533-568.

Dolmans, D. (2003). The effectiveness of PBL: The debates continues. Some concerns about the BEME movement. Medical Education, 37, 1129-1130.

Donaldson, M. (1984). Children's Minds. London: Fontana.

Douvlou, E. (2006, September). Effective Teaching and Learning: Integrating Problem based Learning in the Teaching of Sustainable Design. CEBE Transactions, 3(2), 23-37 (15).

Du, Xiangyun (2006). Gendered practices of constructing an engineering identity in a problem-based learning environment. European Journal of Engineering Education, 31(1). 35-42.

Education Act (1996). Ministry of Education Malaysia. Kuala Lumpur.

Eisner, E. (1993). Forms of Understanding and the Future of Educational Research. Educational Researcher, Vol. 22, No. 7, 5-11.

Engel, J. (1991). Not Just a Method but a Way of Learning. In D. Boud & G. Feletti (Eds.), The Challenge of Problem-Based Learning. New York: St. Martin's Press.

Ennis, R. H. (1987). A Taxonomy of critical thinking dispositions and abilities. In J. Baron & R. Sternberg (Eds.), Teaching Thinking Skills: Theory and Practice (p. 9-26). New York: W. H. Freeman.

Entwistle, N. J., McCune, V. S., & Walker, P. (2001). Conceptions, styles, and approaches within higher education: Analytical abstractions and everyday experience. In R. J. Sternberg & L.-F. Zhang (Eds.), Perspectives on thinking, learning and cognitive styles (pp. 103 – 136). Mahwah, NJ: Lawrence Erlbaum.

Entwistle, N. J. (2003). Concepts and Conceptual Frameworks Underpinning the ETL Project: Enhancing Teaching-Learning Environments in Undergraduate Courses Project, Higher and Community Education, School of Education, University of Edinburgh, Occasional Report 3 (March). Retreived May 3, 2011 from http://www.etl.tla.ed.ac.uk/docs/ETLreport3.pdf

Evans, B. C. & Bendel, R. (2004). Cognitive and ethical maturity in baccalaureate nursing students: did a class using Narrative Pedagogy make a difference? Nursing Education Perspectives, 25 (4), 188-95

Facione, P. A (1990). Executive summary – critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. Millbrae, CA: The California Academic Press. (The complete Delphi report, including appendices, is available from The California Academic Press and as ERIC Doc. No. ED 315-423, P. Facione, Principal Investigator).

Facione, P. A. (2006). Critical Thinking: What it is and why it counts. Insight Assessment, California Academic Press.

Facione, P. A. (2011). Think Critically. In CCTST Test Manual, Insight Assessment, Millbrae: CA, pp. 4.

Facione, P., Facione, N., Blohm, S., Howard, K., & Giancarlo, C. (1998). The California Critical Thinking Skills Test: Test manual. Millbrae, CA: California Academic Press.

Farrow, R., & Norman, G. (2003). The effectiveness of PBL: The debate continues. Is meta-analysis useful? Medical Education, 37, 1131-1132.

Fisher, A. (2001). Critical Thinking: An Introduction. Cambridge University Press.

Fisher, R. (2005) (2nd ed.). Teaching Children to Think. Cheltenham: Nelson Thornes.

Flavell, J. H. ((1979). Metacognition and cognitive monitoring: a new area of cognitive developmental inquiry. American Psychologist 34, 906-911.

Flint, W. J. (2007). PBL: Welcome to the "Real World" A Teaching Model for Adult Learner. US: Word Unlimited.

Folashade, A., & Akinbobola, A. O. (2009). Constructivist Problem-Based Learning Technique and the Academic Achievement of Physics Students with Low Ability Level in Nigerian Secondary Schools. Eurasian J. Phys. Chem. Educ. 1(1), 45-51. Retrieved September 13, 2010 from http://eurasianjournals.com/index.php/ejpce/article/viewFile/34/59

Forgathy, R. & McTighe, J. (1995). Educating teachers for higher order thinking: The three story intellect. Theory into Practice, 32(3), 161-169.

FPN (National Education Philosophy) (1996). Ministry of Education, Kuala Lumpur,

Frankael, J. R. & Wallen, N. E. (1996). How to design Research in Education (3rd ed.). New York McGraw-Hill, Inc.

Frenay, M., Galand, B., Milgrom, E., & Raucent, B. (2007). Project and Problem based learning in the first two years of the engineering curriculum at UCLouvain. In A. Kolmos & E. De Graaff (Eds), Management of change: Implementation of problem-based and project-based learning in engineering (pp. 93-108). Rotterdam: Sense Publisher.

Frijters, S., Dam, G. T., & Rijlaarsdam, G. (2008). Effects of dialogic learning on value-loaded critical thinking. Learning and Instructions, 18(1), 62-82. doi:10.1016/j.learnininstruc.2006.11.01

Frost, M. (1996). An analysis of the scope and value of problem-based learning in the education of health care professionals. Journal of Advanced Nursing, 24 (5), 1047–1053. Retrieved June 3, 2011, from http://onlinelibrary.wiley.com/doi/10.111/j.1365-2648.1996.tb02942.x/abstarct

Gabr, H.,& Mohamed, N. (2011). Effect of Problem-based Learning on undergraduate nursing students enrolled in Administration course. Journal of Academic Research, 3(1), 154-162.

Gagne, R. M. (1965). The Learning of Concepts. The School Review, 75, 187-196.

Geerlings, T. (1995). Students' thoughts during Problem-based small group discussions. Instructional Science, 22, 269-278.

Gersten, R., Jordan, N. C., & Flojo, J. R. (2005). Early identification and interventions for students with mathematics difficulties. Journal of Learning Disabilities, 38, 293–304.

Gijsealers, W. H., & Schmidt, H. G. (1990). Development and evaluation of a casual model of Problem-based learning. In Z. M. Norman, H. G. Schmidt, E. S. Ezzat (Eds.). Innovation in Medical Education: An evaluation of its present status (pp. 95-113). New York: Springer Publishing Company.

Gokhale, A. A. (1995). Collaborative learning enhances critical thinking skill. Journal of Technology Education, 7(1). Retrieved March 2, 2011 from http://www.scholar.lib.vt.edu/journals/JTE/v7nl/gokhale.jte-v7n1.html

Goodfellow, L. T. (2001, Spring). A self-assessment by respiratory therapists of their own critical thinking behaviors. Journal of Allied Health, 30(1), 20-25.

Guiller, J., Durndell, A., & Ross, A. (2008). Peer Interaction and critical thinking: Face-to-face or online discussion? Learning and Instruction, 18, 187-200.

Gurrie, J. (2003). What is your problem? Elearnspace. Retrieved June 10, 2008, from http://www.elearnspace.org/Article/contributor/pbl.htm.

Hays, J. R., & Simon, H. A. (1974). Understanding written problem instructions. In L. W. Gregg (Ed.), Knowledge and Cognition (pp. 167-200). Hillsdale, NJ: Erlbaum.

Heinrichs, K. I. (2002). Problem-based learning in entry-level athletic training professional-education programs: A model for developing critical thinking and decision making skills. Journal of Athletic Training, 37(4 Supplement), S-189-S-198.

Hendry, G. D., Ryan, G., & Harris, J. (2003). Group problems in Problem-based Learning . Medical Teacher, 25(6), 609-616.

Hitchcock, M. A., & Anderson, A. S. (1997). Dealing with dysfunctional tutorial groups. Teaching and Learning in Medicine, 9(1), 19-24.

Hmelo-Silver, C., & Lin, X. (2000). Becoming self-directed learners: Strategy development in problem-based learning, In D. E. Evensen & C. E. Hmelo (Eds), Problem–based learning: A research perspective on learning interactions (pp. 227-250). Mahwah, NJ: Lawrence Erlbaum Assoc., Inc., Publishers.

Hmelo-Silver, C. E. (2004). Problem-Based Learning: what and how do students learn? Educational Psychology Review, 16(3), 235-266.

Hmelo-Silver, C. (2009). What do we know about problem-based learning? Current status and future prospects. Keynotes speaker will present in 2[nd] International PBL Symposium. Singapore: Republic Polytechnic, 10-12 June. Retrieved January 10, 2009, from
http://www.rp.sg/symposium/2009/keynote_hmelosilver.asp

Hollister, B. C. (1997). Stripping away layers of the opinion or tracking a problem. The Problem Log, 2 (2), 3. Retrieved December 12, 2009, from
http://pbln.imsa.edu/resources/articles/plog_1997-02-2.pdf

Homer, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The Use of Single-Subject Research to Identify Evidence-Based Practice in Special Education. Exceptional Children, 71. Retrieved December 12, 2009, from
http://www.questia.com/googleScholar.qst;jsessionid=LW1DhQjhLJGp1RxtXlg8n69Rl6BhZpwcq1vG8GvWyQn2FW4ChF03!1398761721!157216685?docId=5008469634

Huit, W. (1992). Problem-solving and decision-making: Consideration of individual differences using the Myers-Briggs type indicator. Journal of Psychological Types, 24, 33-44.

Huitt, W. (2001 1988). Humanism and open education [Electronic Version]. Educational Psychology Interaction. Retrieved March 28, 2011. From http://chiron.valdosta.edu/whuitt/col/affsys/humed.html

Innabi, H & El Sheikh, O. (2006). The Change in Mathematics Teachers Perceptions of Critical Thinking After 15 Years of Educational Reform in Jordan. Educational Studies in Mathematics, 64, 45-68. Retrieved on December 8, 2008, from http://springerlink.metapress.com/content/1573-0816

Jacobs, A. E. J. P., Dolmans, D. H. J. M., Wolfhagen, I. H. A. P., & Scherpbier, A. J. J. A. (2003). Validation of a short questionnaire to assess the degree of complexity and structuredness of PBL problems. Medical Education, 37(1), 1001-1007. doi:10.1046/j.1365-2923.2003.01630.x

Jonassen, D. H., & Hung, W. (2008). All problems are not equal: Implications for problem-based learning. The Interdisciplinary Journal of Problem-based Learning, 2(2), 6-28.

Juremi, S. (2003). Kesan penggunaan pembelajaran berasaskan masalah terhadap pemikiran kritis, pemikiran kreatif dan proses sains dalam pembelajaran biologi [The effectiveness of problem-based learning towards critical thinking, creative thinking, and science process in biology learning]. Unpublished PhD dissertation, Universiti Sains Malaysia, Pulau Pinang, Malaysia.

Kaddoura, M. A. (2011). Critical Thinking Skills of Nursing Students in Lecture-Based Teaching and Case-Based Learning. International Journal for the Scholarship of Teaching and Learning, 5 (2), 1-18. Retrieved on December 18, 2011, from http://academics.georgiasouthern.edu/ijsotl/v5n2/articles/PDFs/Kaddoura.pdf

Karakas, M. (2008). Graduating Reflective Science Teachers Through Problem-Based Learning Instruction. Bulgarian Journal of Science and Education Policy (BJSEP), 2(1), 59-71. Retrieved November 11, 2011, from http://bjsep.org/getfile.php?id=12

Kember, D. (2000). Misconceptions about the learning approaches, motivation and study practices of Asian students. Higher Education, 40(1), 99-121. Retrieved September 12, 2010, from http://www.springerlink.com/content/q97v8075385179x0/

Keppel, G. (1991). Design and analysis: A researcher's handbook (3rd. ed). In J. W. Creswell (Eds.). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (pp. 12 & 155). London: Sage Publications, Inc.

Kinnunen, P., & Malmi, L. (2005). Problems in Problem-Based Learning - Experiences, Analysis and Lessons Learned on an Introductory Programming Course. Informatics in Education, 4 (2), 193-214.

Kivela, J., & Kivela, R. J., (2005). Student perceptions of an embedded problem-based learning instructional approach in a hospitality undergraduate programme. International Journal of Hospitality Management, 24(3), 437-464.

Kuhn. T. S. (1961). "The Function of Measurement in Modern Physical Science", ISIS 52(2), 161–193.

Kurubacak, G. (2006). Building knowledge networks through project-based online learning: A study of developing critical thinking skills via reusable learning objects. Computer in Human Behavior, 23(6), 2668-2695. doi:10.1016/j.chb.2006.08.003

Kwan, C.Y. (2000). "What the problem-based learning (PBL): it is magic, myth and mindset". National University of Singapore Centre for Development of Teaching and Learning Brief, 3 (3), 1-2.

Lave, J. and Wenger, E. (1991). Situated Learning. Legitimate peripheral participation, Cambridge: University of Cambridge Press.

Lemke, J. L. (2001). Articulating communities: Sociocultural perspectives on science education. Journal of Research in Science Teaching, 38(3), 296-316.

Lesperance, M. M. (2008). The Effects of Problem Based Learning (PBL) on Students' Critical Thinking Skills. EdD dissertation, University of North Carolina at Greensboro (UNCG). Retrieved February 6, 2010 from http://libres.uncg.edu/ir/uncg/f/Lesperance_uncg_0154D_10040.pdf

Lochhead, J. & Clement, J. (1980). Cognitive process instruction. Hillsdale, NJ: Lawrence Erlbaum, 33-146.

Loy, G. L., Gelula, M. H. & Vontver, L. A. (2004). Teaching students to question. American Journal of Obstetrics and Gynecology, 191 (5), 1752-6.

Lipman, M. (1988). Critical thinking: What it can be? Educational Leadership. 46 (1), 38-43.

Lipsey, M. W. (1990). Design Sensitivity: Statistical Power for Experimental Research. Newbury Park, CA: Sage Publications.

Lipsey, M. W. & Wilson, D. B. (1993). The efficacy of psychological, educational and behavioral treatment: Confirmation of meta-analysis. American Psychologist, 48 (12), 1181-1209.

Lusardi, M. M., Levangie, P. K., & Fein, B. D. (2002). A Problem-Based Learning Approach to Facilitate Evidence-Based Practice in Entry-Level Health Professional Education. American Academy of Orthotists and Prosthetists, 14 (2), 40-50. Retrieved April 29, 2012 from
http://www.oandp.org.jpo/library/2002_02_040.asp

Maddocks, A. (2004). Personal development planning and portfolio building-introducing undergraduates to the processes of professional development. In C. Baillie, & I. Moore, (Eds.), Effective learning and teaching in Engineering (pp. 171-184), London: Routledge.

Maddux, C. D., Johnson, D. L., & Willis, J. W. (1997). Educational computing, learning with tomorrow's technologies (2nd ed.). Allyn Bacon: Needham Height.

Magnussen, L., Ishida, D., & Itano, J. (2000). The impact of the Use of Inquiry-Based Learning as a Teaching Methodology on the Development of Critical Thinking, Journal of Nursing Education, 39(8), 360-364.

Major, C. H., & Palmer, B. (2001, Spring). Assessing the effectiveness of problem-based learning in higher education: Lessons from the literature. Academic Exchange Quarterly, 5(1). Retrieved November 22, 2008, from
http://www.rapidintellect.com/AEQweb/mop4spr01.htm

Margetson, D. (1991). Why is problem-based learning a challenge?. In D. Boud & G. Feletti (Eds.), The challenge of problem-based learning, (Ch. 4, pp.42-50). London: Kogan Page.

Marketa, S. (2008). The effect of using computer simulations as self-directed learning on critical thinking levels in entry-level athletic training students. Phd Dissertation, Ohio University. Retrieved July 3, 2011, from
http://proquest.umi.com/pqdlink?did=1597615461&Fmt=7&clientId=79356&RQT=309&VName=PQD

Martin, L., West, J., & Bill, K. (2008). Incorporating problem-based learning strategies to develop learner autonomy and employability skills in sports science undergraduates. Journal of Hospitality, Leisure, Sport and Tourism Education, 7(1), 18-30. Retrieved March 8, 2012 from
http://www.heacademy.ac.uk/assets/hlst/documents/johlste/vol7no1/martin.pdf

Masek, A. & Yamin, S. (2012). "The Impact of Instructional Methods on Critical Thinking: A comparison of problem-based learning and conventional approach in engineering education". ISRN Education, (vol. 2012), Article ID 759241, 6 pages. doi:10.5402/2012/759241. Retrieved 8 May 2012 from
http://www.isrn.com/journals/education/2012/759241/cta/

McGee, M. R. (2003). A comparison of traditional learning and problem-based learning in pharmacology education for athletic training students. Unpublished doctoral dissertation, The University of North Carolina, Chapel Hill.

Merriam, S., & Caffarella, R. (1991). Learning in adulthood: A comprehensive guide. San Francisco: Jossey-Bass.

McBride, R. E. (1991). Critical thinking: An overview with implications for physical education. Journal of Physical Education, Reacreation and Dance, 69(7), 112-125.

Meyers, C. (1986). Teaching students to think critically. San Francisco: Jossey-Bass.

Mohamad Najib, A. B. (1999). Educational research (Penyelidikan Pendidikan). Skudai: Penerbit Universiti Teknologi Malaysia.

Mohd Majid, K, Khatijah, Y & Sidek, A. A. (2008). Human capital development: Soft skill initiatives at Universiti Putra Malaysia. Journal of the World Universities Forum, 1(4), 89-98.

Mokhtar, I. (1995). Classroom assessment (Penilaian di bilik darjah). Kuala Lumpur: Dewan Bahasa & Pustaka.

Mokhtar, M. Z., Tarmizi, M. A. A., Tarmizi, R. A., & Ayub, A. F. M. (2010). Problem-based learning in calculus course: Perception, engagement and performance. Latest Trends on Engineering Education, 21-25. Retreived March 10, 2011, from
http://www.wseas.us/e-library/conferences/2010/Corfu/EDUCATION/EDUCATION-01.pdf

Molitor, L. L. & George, K. D. (1976). Development of a test of science process skills. Journal of Research in Science Teaching, 13, 405-412.

Morales-Mann, E. T., & Kaitell, C. A. (2001). Problem-based learning in a New Canadian curriculum. Journal of Advanced Nursing, 33 (1), 13-19.

Moust, J.H.C., Schmidt, H.G., De Volder, M.L., Beliën, J.J.J., & De Grave, W.S. (1986). Effects of verbal participation in small-group discussion on learning. In J.T.E. Richardson, M.E. Eysenck, & D.W. Piper (Eds.), Student learning: Research in education and cognitive psychology (pp. 147-155). Guilford, UK: Society for Research into Higher Education.

National Education Philosophy. (1996). Ministry of Education, Kuala Lumpur.

Naznin, M., Pakeer-Oothuman, Nasuruddin, B.A., & Abdul-Wahab, J. (2008, June). Problem-Based Learning As Perceived By Medical Students in a Non-Problem Based Medical Curriculum. International Medical Journal, 7(1). Retrieved July 22, 2011, from http://www.eimjm.com/Vol7-No1/Vol7-No1-B2.htm

Neo, M & Neo, T. K. (2000). Multimedia Learning: Using multimedia as a platform for instruction and learning in higher education. Paper presented at the Multimedia University International Symposium on Information and Communication Technologies 2000 (M2USIC'2000), October 5-6, Petaling Jaya, Malaysia.

Neo, T. K., & Neo, M. (2001). Problem-based learning: Reconstructing a website using multimedia authoring tools. Retrieved November 13, 2008, from http://www.tp.edu.sg/pblconference/full/Neo%20T.%20K%20and%20Neo%20M.pdf

Neuman, S. B., & McCormick, S. (Eds.) (1995). Single-subject experimental research: Application for literacy. In J. W. Creswell (Eds.). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (Eds.) (p. 12). London: Sage Publications, Inc.

Newman, M. (2003). A pilot systematic review and meta-analysis on the effectiveness of problem-based learning. On behalf of the Campbell Collaboration Systematic Review Group on the effectiveness of problem-based learning. Learning and Teaching Subject Network-01. Newcastle: LTSN 2003. Retrieved December 2, 2008, from http://www.ltsn-01.ac.uk/resources/features/pbl

Newman, M., Van den Bossche, P., Gijbels, D., McKendree, J., Roberts, T., Rolfe, I., et al (2004). Responses to the pilot systematic review of problem-based learning. Medical Education, 38, 921-923.

New Straits Times. (2008, June 23). Education system to blame, says professor. Retrieved June 26, 2010 from http://www.encyclopedia.com/doc/1P1-157636181.html

Nickerson, R. S. (1987). Why teach thinking? In J.B. Baron & R.J. Sternberg (Eds.), Teaching thinking skills: Theory and practice (pp. 27-37). W.H. Freeman and Company, New York.

Nordin, M. K. (2011, Minister speech). Officiating ceremony of the 2[nd] Phase of The Action Plan for the National Higher Education Strategic Plan (PSPTN), MOHE. Putrajaya International Conference Centre (PICC). June 7. Retrieved June 9, 2011, from http://www.mohe.gov.my/portal/images/infokpt/ucapan/menteri/ucapan_psptn_fasa2.pdf

Norman, D. (1980). Cognitive Engineering and Education. In D.T. Tuna & F. Reif (Eds), Problem Solving and Education: Issues in Teaching and Research. Erlbaum Publishers.

Norman, G. R., & Schmidt, H. G. (1992). The psychological basis of Problem-Based Learning: A Review of the Evidence. Academic Medicine, 67 (9), 557-565. Retrieved November 15, 2012 from http://www.ncbi.nlm.nih.gov/pubmed/1520409

North Central Regional Educational Laboratory (2004). Traditional Curriculum Design. Retrieved January 15, 2011 from http://ncrel.org/sdrs/area/issues/envrnmnt/drugfree/sa3trad.htm

Noushad, P. P. (2008). Cognitions about Cognitions: The Theory of Metacognition. ERIC #: ED502151. Retrieved April 11, 2011 from http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED502151&ERICExtSearch_SearchType_0=no&accno=ED502151

Novak J. D. (1993), Human constructivism: A unification of psychological and epistemological phenomena in meaning making. International Journal of Personal Construct Psychology, 6, 167-193. Retrieved December 16, 2011, from http://www.tandfonline.com/doi/pdf/10.1080/08936039308404338

Nuy, H. J. P., & Moust, H. C. (1990). Students and problem-based learning: How well do they fit in? Journal of Professional Legal Education, 8(2), 97-114.

Ozturk C, Muslu GK, Dicle A (2008). A comparison of problem-based and traditional education on nursing students' critical thinking dispositions. Nurse Education Today, 28 (5), 627-32. Retrieved December 16, 2011, from http://www.ncbi.nlm.nih.gov/pubmed/18054412

Parahoo, K. (1997). Nursing Research: Principles, Process and Issues. Basingstoke, Palgrave.

Pastirik, P. J. (2006). Evaluating critical thinking in clinical concept maps: a pilot study. International Journal of Nursing Education Scholarship, 3, Article 27.

Patel, V. L., Groen, G. J., and Norman, G. R. (1991). Effects of conventional and problem-based medical curricula on problem-solving. Academic Medicine, 66(7):380-389.

Paul, R. & Elder, L. (2003). A Miniature Guide for Those Who Teach On How to Improve Students Learning: 30 practical ideas. California: Foundation for Critical Thinking.

Paul, R. & Elder, L. (2005). A guide for educators to critical thinking competency standards: standards, principles, performance, indicators, and outcomes with critical thinking master rubric, Foundation for Critical Thinking. Retrieved October 12, 2008, from http://www.criticalthinking.org

Paul, R.W., and Elder, L. (2007a). Defining Critical Thinking. Retrieved June 3, 2010 from www.criticalthinking.org/aboutCT/define_critical_thinking.cfm

Paul, R. W. and Elder, L. (2007b). California teacherpPreparation for instruction in critical thinking: research findings and policy recommendations California Commission on Teacher Credentialing, Sacramento California.

Pavlov, I. (1930). Psychologies of 1930. Worcester, MA: Clark University Press.

PBL Insight. (2001), Vol. 3, No. 3. University of Stamford, United States, p. 14. Retreived November 29, 2009, from http://www4.samford.edu/pubs/pbl/pbl3.3.pdf

Pepa, C.A., Brown, J. M., & Alverson, E. M. (1997). A comparison of critical thinking abilities between accelerated and traditional baccalaureate nursing students. Journal of Nursing Education, 36, 46-48. Retrieved May 2, 2011 from http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Retrieve&list_uids=8986961&dopt=abstractplus

Perkins, D.N. (1987). Thinking Frames: An Integrative Perspective on Teaching Cognitive Skills. In Baron, J.B. & Sternberg, R.J. (Eds.), Teaching thinking skills: theory and practice (pp. 41-61). New York: W.H. Freeman & Company.

Peterson, T. O. (2004, October). So you're thinking of trying problem-based learning?: Three Critical Success Factors for Implementation, Journal of Management Education, 28, 630-647. Retrieved December 2, 2009, from http://jme.sagepub.com/cgi/content/abstract/28/5/630

Phillips, J. A. (1997). Teaching thinking skills; Theory and practice (Pengajaran kemahiran berfikir: Teori dan amalan). Kuala Lumpur: Utusan Publications & Distributors.

Polit, D. F., Beck, C. T., & Hungler, B. P. (2006). Essentials of nursing research: Methods, appraisal and utilization (6th eds). Philadelphia, Lippincot.

Profetto-McGrath, J. (2005). Critical thinking and evidence-based practice. Journal of Professional Nursing, 21(6), 364-371.

Prosser, M, & Trigwell, K. (1999). Understanding learning and teaching: The experience in higher education. SRHE and Open University Press: Buckingham.

Pusat Perkembangan Kurikulum (Curriculum Development Centre, PPK). (2003). Main plan of vocational subjects in daily school for 2002-2003 (Plan Induk MPV di Sekolah Harian Bagi Tahun 2002 – 2003). Kuala Lumpur: Kementerian Pendidikan Malaysia.

Radin Omar, R. S. (2011, speech). Universiti Putra Malaysia Vice Cancellor speech at 2010 Putra Academic Grand Ceremony [Naib Canselor Universiti Putra Malaysia pada Majlis Gemilang Akademia Putra 2010 (MGAP10)], UPM Serdang, May 5. Retrieved June 3, 2011, from http://www.mstar.com.my/variasi/kampus/cerita.asp?file=/2011/5/5/mstar_kampus/20110505204258&sec=mstar_kampus

Ramsden, P. (1992). Learning to teach in higher education. London: Routledge.

Richardson, J. T. E. (2006). The future of research in problem-based learning. In H. Crabtree, A. Darvill, K. Holland, S. Mackay, M. McLoughlin, D. Oakley, & J. Supyk (Eds.), Problem-based learning 2004 A Quality Experience? (pp. 41-59). University of Salford.

Rosenthal, R., & Rosnow, R. L. (1991). Essentials of behavioral research, methods and data analysis. San Francisco: McGraw-Hill, 276-300.

Ryle, G. (1949). The concept of mind. Chicago: The University of Chicago Press.

Rudd, R. D. (2007, October). Defining Critical Thinking, Techniques (ACTE), 82(7), 46-49. Retrieved November 2, 2008, from http://www.acteonline.org

Sahin, M. (2010). The impact of problem-based learning on engineering students' beliefs about physics and conceptual understanding of energy and momentum. European Journal of Engineering Education, 35(5), 1469-5898, 519-537. Retreived August 22, 2011, from http://www.informaworld.com/smpp/content~db=all~content=a922674173

Salah al-Fadhli & Abdul Wahed, K. (2009). Developing critical thinking in e-learning environment: Kuwait University as a case study. Assessment and Evaluation in Higher Education, 35 (5), 529-536. Retrieved August 22, 2011, from http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=EJ865455&ERICExtSearch_SearchType_0=no&accno=EJ865455

Salemi, Michael K., John J. Siegfried, Kim Sosin, William B. Walstad, and Michael Watts. (2001). Research in economic education: Five new initiatives. American Economic Review 91(2): 440-445.

Salkind, N.J. (2000). Exploring research (4th ed.). Upper Saddle River: Prentice Hall.

Salleh, M. B., Othman, H., Esa, A., Sulaiman, A., & Othman, H. (2007). Adopting problem-based learning in the teaching of engineering undergraduates: A Malaysian experience, International Conference on Engineering Education, Portugal: Coimbra, September, 3-7. Retrieved January 15, 2009, from http://icee2007.dei.uc.pt/proceedings/papers/243.pdf

Sanson-Fisher, R. W., & Lynagh, M. C. (2005). Problem-based learning: A dissemination success story? Medical Education, 183(5), 258-260.

Sararinen-Rahiika, H., & Binkley, J. (2998). Problem-based learning in physical therapy: a review of the literature and overview of the McMaster University experience. Phys Ther, 78, 195-207.

Satterly, D. (1987). Piaget and education. In R L Gregory (ed.), The Oxford Companion to the Mind Oxford. Oxford University Press.

Savery, J. R., & Duffy, T. M. (1995). Problem-based learning: An instructional model and its constructivist framework. Educational Technology, 35(5), 31-35.

Savin-Baden, M. (2000). Problem-based learning in higher education: Untold stories. Buckingham, UK: Open University Press/SRHE.

Savin-Baden, M. (2003). Facilitating PBL: Illuminating perspectives. London: The Society for Research into Higher Education & Open University Press.

Sax, G. & Newton, J.W. (1997). Principles of educational and psychological measurement and evaluation. Belmont: Wadsworth Publishing Company.

Schmidt, H. G. (1983). Problem-based learning: Rationale and description. Medical Education, 17, 11-16.

Schmidt, H., Dauphine, W., & Patel, V. (1987). Comparing the effects of problem based and conventional curricula in an international sample. Journal of Medical Education, 16(1), 7–17.

Schmidt, H. G. & Moust, J. H. C. (2000). Factors affecting small group tutorial learning: A review of research. In D. H. Evensen & C. E. Hmelo-Silver (Eds.), Problem-based learning: A research perspective on learning interactions (pp. 19-52). Mahwah, NJ: Lawrence Erlbaum.

Schunk, D. H. (2000). Learning theories: an educational perspective. New Jersey: Prentice-Hall.

Selcuk, G. S. (2010). The effects of problem-based learning on pre-service teachers' achievement, approaches and attitudes towards learning physics. International Journal of the Physical Sciences, 5(6), 711-723. Retrieved May 2, 2011 from http://www.academicjournals.org/ijps/PDF/pdf2010/Jun/Sel%C3%A7uk.pdf

Siegfried, John J. et al. (1991). The status and prospects of the economics major. Journal of Economic Education 22, 197-224.

Shayer, M. & Adey, P. (1990). Accelerating the development of formal thinking in middle and high school students. Journal of Research in Science Teaching, 27(3), 267-285.

Silen, C. (2009). Self-directed learning as learning process and a learning outcome. Invited Speaker will present in 2nd International PBL Symposium. Singapore: Republic Polytechnic, June, 10-12. Retrieved January 10, 2009, from http://www.rp.sg/symposium/2009/abstract_silen.asp

Skinner, B. F. (2002). Beyond freedom and dignity. Indianapolis, IN: Hackett Publishing Company, Inc.

Smith, M. K. (1999). 'Learning theory', the encyclopedia of informal education. Retrieved October 10, 2010, from www.infed.org/biblio/b-learn.html

Smith, G. (April, 2005). Problem-Based Learning: Can it Improve Managerial Thinking? Journal of Management Education, 29(2), 357-378. Retrieved 14 March, 2011, from http://jme.sagepub.com/content/29/2/357

Smith, M. & Cook, K. (2012). Attendance and Achievement in problem-based learning: The value of scaffolding. Interdisciplinary Journal of Problem-based Learning, 6(1), Article 8, 129-152. Retrieved April 30, 2012 from http://docs.lib.purdue.edu/ijpbl/vol6/iss1/8

Spence, L. (2004). The usual doesn't work: Why we need problem-based learning. Portal: Libraries and the Academy, 4(4), 485-493.

Sternberg, R. J., & Lubart, T. I. (1995). Defying the crowd: Cultivating creativity in a culture of conformity. New York: Free Press.

Strohm, S. M. & Baukus, R. A. (1995). Strategies for fostering critical thinking skills. Journalism and Mass Communication Educator, 50(1), 55-62.

Sulaiman, F. (2011). The effectiveness of Problem-Based Learning (PBL) online on students' creative and critical thinking in Physics at tertiary level in Malaysia. Published PhD dissertation, Centre for Science and Technology Education Research, University of Waikato Hamilton, New Zealand.

Swartz, R. J., & Park, S. (1994). Infusing critical and creative thinking into content instruction. California: Critical Thinking Press and Software.

Syed Anwar A. M. A. B. (2002). Kesan kaedah Pembelajaran Berasaskan Masalah dengan perancahan berstruktur terhadap prestasi pengetahuan, prestasi taakulan dan dinamisme pembelajaran konstruktivis dalam Kimia Matrikulasi. (The effect of Problem-Based Learning with structured scaffolding on knowledge performance, reasoning performance and constructive learning dynamism in Matriculation Chemistry). Unpublished PhD dissertation, Penang: Universiti Sains Malaysia.

Tabachnick, B. G. & Fidell, L. S. (2001). Using multivariate statistics (4th ed.). Needham Heights, MA: Allyn & Bacon.

Tabachnick, G. G., & Fidell, L. S. (2007). Experimental Designs Using ANOVA. Belmont, CA: Duxbury.

Tan, O. S. (2007). Problem-based learning pedagogies: psychological processes and enhancement of intelligences. Educational Research Policy Practices, 6, 101–114.

Tan, S. S., & Ng, C. K. F. (2006). A problem-based learning approach to entrepreneurship education. Journal of Education and Training, 48(6), 416-428. Retrieved December 21, 2008, from http://www.emeraldinsight.com/0040.0912.htm

Tennant, M. (1997). Psychology and Adult Learning, London: Routledge.

The Ninth Malaysia Plan (RMK-9). (2006). Ministry of Prime Minister Department, Putrajaya: Malaysia.

The Quality Assurance Agency for Higher Education (2002).   Psychology honours degree benchmark statement. Gloucester, UK: Cambridge University Press.

Thomas, R. M., (2003). Blending qualitative and quantitative research methods in theses and dissertations. California: Corwin Press, Inc.

Tishman, S., & Perkins, D. (1995, August). Critical thinking and physical education. Journal of Physical Education and Recreational Dance. 66(6), 24-30.

Tiwari, A., Chan, S., Sullivan, P. L., Dixon, A. S., and Tang, C. (1999). Enhancing students' critical thinking through problem-based learning. Retrieved 1 March, 2011 from http://teaching.polyu.edu.hk/datafiles/R93.pdf

Tiwari, A., Lai, P., So, M., & Yuen, K., (2006). A comparison of the effects of problem-based learning and lecturing on the development of student's critical thinking. Medical Education, 40, 547-554.

Tiwari, A., Chan, S., Wong, E., Wong, D., Chui, C., Wong, A. & Patil, N. (2006). The effect of problem-based learning on students' approaches to learning in the context of clinical nursing education, Nurse Education Today, 26(5), 430–438.

Tiwari, A. (2009).   Facilitating student learning during problem-based learning tutorials. Invited Speaker will present in 2[nd] International PBL Symposium. Singapore: Republic Polytechnic, June, 10-12.   Retrieved January 10, 2009, from http://www.rp.sg/symposium/2009/abstract_tiwari.asp

Todd, S. (1991). Preparing tertiary teachers for problem-based learning. In D. Boud & G. Feletti (Eds.), The challenge of problem-based learning (Ch. 13, pp. 131-136). London: Kogan Page.

Torp, L., & Sage, S. (1998). Problem as possibilities: Problem-based kearning for K-12 education (1[st] ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Torp, L., & Sage, S. (2002). Problem as possibilities: Problem-based learning for K-16 education (2[nd] ed.).   Alexandria, VA: Association for Supervision and Curriculum Development.

Torrance, E. P. (1990). Torrance tests of creative thinking verbal forms A and B: Manual for scoring and interpreting results. Benseville, IL: Scholastic Testing Service.

Totten, S., Sills, T., Digby, A., & Russ, P. (1991). Cooperative learning: A guide to research. New York: Garland.

UPSI (2008). Tuanku Bainun Library Startegic Plan, 2008-2010 (Pelan Strategi Perpustakaan Tuanku Bainun 2008-2010). Retrieved July 3, 2011 from http://pustaka.upsi.edu.my/Document/Library_Strategic_Plan.pdf

Utusan Malaysia (2011, February 28). UM: Inggeris diutamakan (UM: Where English is given priority). Utusan Online. Retrieved March 3, 2011, from www.utusan.com.my

Van Gyn, G., & Grove-White, E. (2005). Theories of learning in education. In R. K. Coll & C. Eames (Eds.), International handbook for cooperative education (pp. 37- 8). Boston: World Association for Cooperative Education.

Velde, B. P., Wittman, P. P. & Vos, P. (2006). Development of critical thinking in occupational therapy students. Occupational Therapy International, 13 (1), 49-60. Retrieved November 12, 2009, from http://www.ncbi.nlm.nih.gov/pubmed/16715642

Vygotsky, L. S. (1978). Mind in society. Harvard University Press, Cambridge.

Wade, C. (1995). Using writing to develop and assess critical thinking. Teaching of Psychology, 22(1), 24-28.

Walker, G. (2005). Critical thinking in asynchronous discussions. Retrieved March, 10, 2012 from http://itdl.org/Journal?Jun_05/article02.htm

Wan Mohd Zahid Wan Mohd Noordin. 1994. Wawasan pendidikan: Agenda pengisian. Kuala Lumpur: Cahaya Pantai Publishing (M) Sdn. Bhd.

Ward, J. D., & Lee, C. L. (2002). A review of problem-based learning. Journal of Family and Consumer Sciences Education, 20(1), 16-26. Retrieved November 12, 2008, from http://www.bie.org/files/Ward%20&%20Lee_A%20Review%20of%20Problem-Based%20Learning.pdf

Warren, W. J., Memory, D. M., & Bolinger, K. (2004). Improving critical thinking skills in the United States survey course: An activity for teaching the Vietnam war. History Teacher, 37(2), 193-209.

Watson, G., & Glaser, E. M. (1980). Watson-Glaser Critical Thinking Appraisal (WGCTA). San Antonio, TX: Psychological Corp

Wee, K. N. L. (2004). Jump start authentic Problem-based learning. Prentice-Hall Pearson Education South Asia Pte. Ltd., Singapore.

Weerts, S. (2005). Use of films to teach critical thinking. Journal of Nutrition Education Behavior, 37, 100-101.

Weiping, H. (2002). A scientific creativity test for secondary school students. International Journal of Science Education, 24(4), 389-403.

Wheeler, L.A., & Collins, S.K. (2003). The influence of concept mapping on critical thinking in baccalaureate nursing students. Journal of Professional Nursing, 19 (6), 339-46.

Wiersma, W. (1991). Research Method in Education (5[th] ed.). MA: Allyn & Bacon.

Wilkeand, R. R.,& Straits,W. J. (2001).Taking the mystery out of inquiry: Strategies for college educators. Paper presented at Lilly Conference, San Marcos, TX.

William, R., Macdermid, J., & Wessel, J. (2003). Student adaptation to problem-based learning in an entry-level masters' physical therapy program. Psysiotherapy Theory and Practice, 19, 199-212.

Wilson, R. (2009). From competencies to curriculum: Building career paths for frontline workers in behavioural health. Jobs to Career, Robert Wood Johnson Foundation.

Woodward, C. A. (1997). What can we learn from programme evaluation studies in medical education? In D. Boud & G. I. Feletti (Eds.), The challenge of problem-based learning (pp. 294-307). London: Kogan Page.

Woolfolk, A. E. (1998). Educational psychology (7[th] ed.). Boston: Allyn and Bacon.

Yaman, S., & Yalcın, N. (2005). The effect of problem based instruction in science teaching on creative thinking. Ilkoğretim Online, 4(1), 45–52.

Yeo, R. K. (2007). (Re)viewing problem-based learning: An exploratory study on the perceptions of its applicability to the workplace. Journal of Managerial Psychology, 22 (4), 369-391.

Youngman, M.B. & Eggleston, J.F. (1982). Constructing tests and scales. School of Education University of Nottingham.

Yuan, H. B., Kunaviktikul, W., Klunklin, A., & Williams, B. A. (2008). Improvement of nursing students' critical thinking skills through problem-based learning in the People's Republic of China: A quasi-experiment study. Nursing and Health Sciences, 10, 70-76.

Yuan, H. B., Kunaviktikul, W., Klunklin, A., & Williams, B. A. (2008b). Promoting Critical Thinking Skills Through Problem-Based Learning. CMU: Journal of Social Science and Humanities, 2 (2), 85-100.

Zadrak Ndii, M. (2010, February 10).   Problem-Based Learning and National Exam. The Jakarta Post.

Zaidi, I. (2008, July 3). The Higher Education Curriculum should encourage the students become more creative (Kurikulum IPT patut didik pelajar lebih kreatif). Berita Harian, Kuala Lumpur.

Zhang, L. (2007, Summer). Promoting Critical Thinking, and Information Instruction in a Biochemistry Course, Issues in Science and Technology Libraryship. Retrieved December 1, 2008, from http://www.istl.org/07-summer/refereed/html

Zohar, A., Weinberger, Y., & Tamir, P. (1994). The effect of the biology critical thinking project on the development of critical thinking. Journal of Research in Science Teaching, 31(2), 183-196.

| Appendix A (i) | Academic Achievement Test (Pre-Test) |

23.   Jadual di bawah menunjukkan pelbagai kuantiti penggunaan buruh dalam sesuatu kegiatan pertanian.

Kuantiti Buruh	Situasi Keluaran Purata (AP) dan Keluaran Sut (MP)
P	MP mencapai tahap maksimum dan lebih besar daripada AP
Q	AP mencapai tahap maksimum dan sama dengan MP
R	AP lebih besar daripada MP dan MP adalah sifar
S	AP lebih besar daripada MP yang negatif

Pengeluar yang rasional akan menggunakan kuantiti buruh _____

A.   antara Q dengan R.
B.   antara P dengan Q.
C.   antara R dengan S.
D.   kurang daripada P.

24.   Kos tetap bagi sebuah firma ditakrifkan sebagai kos yang _____

A.   berkadar berubah terhadap output.
B.   wujud walaupun output pada jangka pendek adalah sifar.
C.   berpadanan dengan input yang dibeli oleh firma itu pada harga tetap.
D.   hanya wujud apabila kapasiti pengeluaran digunakan dengan sepenuhnya.

25.   Kenyataan manakah yang **paling tepat** menerangkan konsep bayaran pindahan?

A.   Bayaran yang dipindahkan daripada individu ke individu lain.
B.   Bayaran dari kerajaan kepada individu.
C.   Bayaran yang diberi sebagai bantuan kepada orang-orang miskin.
D.   Bayaran yang diterima tanpa sumbangan yang seimbang terhadap pengeluaran.

26.   Keluaran Dalam Negara Kasar (KDNK) adalah termasuk _____

A.   semua barang dan perkhidmatan yang dihasilkan untuk kegunaan sendiri.
B.   semua barang dan perkhidmatan yang dihasilkan dan dinilai pada harga tahun asas.
C.   semua barang dan perkhidmatan yang dihasilkan di dalam sempadan sesebuah negara.
D.   masa lapang, tetapi tidak termasuk barang dihasilkan oleh sektor isi rumah untuk kegunaan sendiri.

27.   Salah satu cara mengira KDNK adalah dengan menjumlahkan _____

A.   penggunaan, upah, kadar bunga, pendapatan sewa dan eksport.
B.   pelaburan, penggunaan, untung syarikat dan eksport bersih.
C.   penggunaan, pelaburan, perbelanjaan kerajaan dan eksport bersih.
D.   upah, untung syarikat, pelaburan bersih dan penggunaan.

[Lihat Sebelah

Soalan 20 adalah berdasarkan Rajah di bawah.

20. Dalam rajah di atas, garis PQ mewakili garis belanjawan untuk seorang pengguna apabila pendapatan yang diperolehinya adalah RM20.00 sehari. Pada mulanya, seunit barang X berharga RM2.00, manakala seunit barang Y pula berharga RM1.25. Garis RS mewakili garis belanjawan yang baru apabila pendapatannya meningkat menjadi RM30.00 sehari dan _____

A. barang X berharga RM3.00 seunit dan barang Y berharga RM2.50 seunit.
B. barang X berharga RM1.50 seunit dan barang Y berharga RM2.00 seunit.
C. barang X berharga RM1.80 seunit dan barang Y berharga RM1.00 seunit.
D. barang X berharga RM1.50 seunit dan barang Y berharga RM2.50 seunit.

21. Antara berikut, yang manakah yang **paling tepat** menerangkan konsep kecekapan ekonomi dalam teori pengeluaran?

A. Kombinasi input yang melibatkan kos malar.
B. Kombinasi input yang melibatkan kos minimum.
C. Kombinasi input yang dapat memaksimumkan kuantiti output.
D. Kombinasi input yang melibatkan kos yang semakin berkurangan.

22. Jadual di bawah menunjukkan kuantiti output yang dikeluarkan pada pelbagai tingkat buruh.

Kuantiti Buruh	Output
2	80
3	76
4	70
5	66

Pada tingkat buruh 3, keluaran purata ialah _____

A. 20.4 unit   C. 25.3 unit
B. 23.5 unit   D. 28.3 unit

[Lihat Sebelah

16.   Jika perubahan harga sebanyak 2% mengakibatkan perubahan sebanyak 10% dalam kuantiti yang diminta, nilai keanjalan permintaan ialah _____

A.   7.0   C.   0.2
B.   20   D.   5.0

17.   Permintaan pengguna untuk sesuatu barangan boleh diterangkan menggunakan konsep utiliti marginal semakin berkurangan. Konsep ini menerangkan _____.

A.   Apabila pendapatan semakin besar, pengguna mempunyai semakin kurang kehendak untuk dipenuhi.
B.   Pengguna mencapai jumlah utiliti yang berkurangan akibat peningkatan penggunaan barang melebihi suatu tingkat tertentu.
C.   Apabila penggunaan sesuatu barang itu meningkat, jumlah kepuasan pengguna akan meningkat juga tetapi dalam kadar yang semakin berkurangan.
D.   Pengguna akan meningkatkan penggunaan sesuatu barang sehingga tingkat di mana utiliti marginal daripada tambahan penggunaan adalah bersamaan dengan sifar.

Soalan 18 adalah berdasarkan Jadual di bawah:

Unit barang	Jumlah Utiliti		
	A	B	C
1	21	7	23
2	41	13	40
3	59	18	52
4	74	22	60
5	85	25	65
6	91	27	68
7	91	28	70

18.   Jika harga barang A, B dan C ialah RM5.00, RM1.00 dan RM4.00, apakah kombinasi barang A, B dan C yang akan dibeli oleh pengguna jika pendapatannya sebanyak RM37.00 bagi memaksimumkan kepuasannya?

A.   2 A, 3 B dan 6 C
B.   4 A, 5 B dan 3 C
C.   4 A, 3 B dan 5 C
D.   Tiada jawapan

19.   Perubahan tingkat harga yang menyebabkan perubahan dalam kuantiti diminta adalah akibat daripada kesan _____

A.   ekonomi bidangan.
B.   dalaman dan luaran.
C.   lebihan dan kurangan.
D.   penggantian dan pendapatan.

13. Di sepanjang keluk permintaan yang bercerun negatif, apabila harga jatuh maka
_____

    A. keanjalan permintaan harga adalah sifar.
    B. keanjalan permintaan harga adalah infiniti.
    C. keanjalan permintaan harga adalah meningkat.
    D. keanjalan permintaan harga akan berkurangan.

Soalan 14 adalah berdasarkan Rajah di bawah.

14. Berasaskan rajah di atas, permintaan bagi barang berkenaan adalah
_____

    A. Anjal
    B. Anjal uniti
    C. Anjal sempurna
    D. Tidak anjal sempurna

Soalan 15 adalah berdasarkan Jadual di bawah:

Harga barang (RM)	Penawaran (kg)
5	700
6	800

15. Jadual di atas menunjukkan penawaran bagi barang X. Jika harga meningkat dari RM5 ke RM6, apakah keanjalan penawarannya? (gunakan kaedah mengira keanjalan titik tengah/purata dan kalkulator untuk mendapatkan jawapan yang tepat)

    A. 0.75   C. 0.73
    B. 0.71   D. 0.9

[Lihat Sebelah

7. Maksud permintaan dalam perspektif ekonomi ialah _____

   A. kemahuan untuk membeli barang dan perkhidmatan pada tingkat harga tertentu.
   B. kesanggupan individu untuk membelanjakan pendapatan yang ada untuk membeli barang dan perkhidmatan.
   C. kemahuan semua individu dalam pasaran untuk membeli barang dan perkhidmatan pada tingkat harga tertentu.
   D. keinginan individu untuk mendapatkan barang dan perkhidmatan serta disokong oleh kemampuan untuk membayar pada tingkat harga tertentu.

8. Jika fungsi bagi sesuatu barang berubah dari $P = 10 - 0.2Q$ ke $P = 7 - 0.3Q$, ini bermakna _____

   A. permintaan barang tersebut telah bertambah.
   B. permintaan barang tersebut telah berkurang.
   C. penawaran barang tersebut telah bertambah.
   D. penawaran barang tersebut telah berkurang.

9. Diandaikan faktor-faktor lain tidak berubah, kenaikan harga kamera akan menyebabkan keluk permintaan filem _____

   A. tidak berubah.
   B. beralih ke kiri.
   C. beralih ke kanan.
   D. menjadi lebih curam.

10. Apabila harga barang A naik, permintaan terhadap barang B meningkat, manakala permintaan terhadap barang C berkurang. Apakah hubungan antara barang A, B dan C?

    A. Barang A merupakan barang pengganti B dan barang penggenap C.
    B. Barang A merupakan barang penggenap B dan barang pengganti C.
    C. Barang A merupakan barang pengganti bagi kedua-dua barang B dan C
    D. Barang A merupakan barang penggenap bagi kedua-dua barang B dan C.

11. Keluk permintaan sesuatu barang akan beralih ke kiri apabila _____

    A. jumlah penduduk bertambah.
    B. harga barang pengganti naik.
    C. harga barang penggenap naik.
    D. pendapatan pengguna meningkat.

12. Apakah kesan terhadap tingkat harga dan kuantiti keseimbangan ayam apabila berlaku kemajuan teknologi dalam industri penangkapan ikan?

    A. Harga ayam naik dan kuantiti keseimbangan ayam berkurangan.
    B. Harga ayam jatuh dan kuantiti keseimbangan ayam berkurangan.
    C. Harga ayam naik dan kuantiti keseimbangan ayam tidak berubah.
    D. Harga ayam tidak berubah dan kuantiti keseimbangan ayam meningkat.

[Lihat Sebelah

Arahan: Jawab **SEMUA** soalan. Pilih jawapan yang paling tepat.

1. Ilmu ekonomi didefinisikan sebagai _____

   A. ilmu kemasyarakatan yang mengkaji gelagat manusia dalam mengagihkan faktor pengeluaran.
   B. kajian mengenai tingkah laku individu dalam menentukan tingkat pengeluaran optimum pada kos minimum.
   C. sains kekayaan dalam sesebuah masyarakat yang menekankan pengagihan faktor pengeluaran dan pendapatan.
   D. kajian sains sosial yang mengkaji gelagat individu dalam memperuntukkan faktor pengeluaran terhad untuk memenuhi kehendak yang tidak terhad.

2. Faktor-faktor pengeluaran terdiri daripada semua di bawah **kecuali** _____

   A. tanah.
   B. buruh.
   C. modal.
   D. wang.

3. Kos lepas menerangkan _____

   A. kos melepaskan barang kedua terbaik.
   B. kos tetap yang dilibatkan dalam jangka masa pendek.
   C. kos yang berkaitan dengan tingkat pengeluaran optimum.
   D. harga yang perlu dibayar untuk menggunakan satu faktor pengeluaran.

4. Makroekonomi merupakan satu cabang ekonomi yang melihat _____

   A. keseluruhan ekonomi.
   B. satu firma sahaja.
   C. individu.
   D. semua firma.

5. Mengapakah kerajaan perlu campur tangan dalam ekonomi?

   A. Kerajaan mempunyai kuasa monopoli.
   B. Kerajaan mempunyai kepentingan dalam sektor tertentu.
   C. Kerajaan ingin mengatasi kelemahan sistem pasaran bebas.
   D. Kerajaan ingin berkongsi keuntungan dengan sektor swasta.

6. Antara berikut, yang manakah **bukan** kebaikan sistem ekonomi pasaran bebas?

   A. Kecekapan ekonomi dapat dicapai.
   B. Mengutamakan kebajikan masyarakat.
   C. Keputusan ekonomi dapat dibuat dengan cepat.
   D. Menggalakkan perkembangan teknologi dan inovasi.

[Lihat Sebelah

28. Dalam pengiraan KDNK, susutnilai adalah _____

   A. diambilkira dalam pendekatan pendapatan atau perbelanjaan.
   B. diambilkira dalam pendekatan pendapatan.
   C. diambilkira dalam pendekatan perbelanjaan.
   D. tidak diambilkira dalam sama ada pendekatan pendapatan atau perbelanjaan.

29. Perkara yang membezakan Keluaran Negara Kasar pada harga pasaran (KNK_{hp}) dengan Keluaran Negara Kasar pada harga faktor (KNK_{hf}) ialah _____

   A. cukai tak langsung dan susut nilai.
   B. cukai tak langsung dan subsidi.
   C. cukai langsung dan susut nilai.
   D. cukai langsung dan subsidi.

30. Pendapatan boleh guna adalah _____

   A. pendapatan yang hanya sementara dan jumlahnya akan berkurangan di masa hadapan.
   B. pendapatan yang boleh digunakan oleh isi rumah bagi tujuan bayar cukai, belanja atau tabungan.
   C. pendapatan selepas ditolak cukai dan boleh digunakan oleh isi rumah bagi tujuan belanja atau tabungan.
   D. pendapatan sebelum ditolak cukai dan boleh digunakan oleh isi rumah bagi tujuan belanja atau tabungan.

SOALAN TAMAT

Arahan: Jawab **SEMUA** soalan. Pilih jawapan yang paling tepat.

1. Ilmu ekonomi didefinisikan sebagai _____

   A. ilmu kemasyarakatan yang mengkaji gelagat manusia dalam mengagihkan faktor pengeluaran.
   B. kajian mengenai tingkah laku individu dalam menentukan tingkat pengeluaran optimum pada kos minimum.
   C. sains kekayaan dalam sesebuah masyarakat yang menekankan pengagihan faktor pengeluaran dan pendapatan.
   D. kajian sains sosial yang mengkaji gelagat individu dalam memperuntukkan faktor pengeluaran terhad untuk memenuhi kehendak yang tidak terhad.

2. Faktor-faktor pengeluaran terdiri daripada semua di bawah **kecuali** _____

   A. tanah.
   B. buruh.
   C. modal.
   D. wang.

3. Kos lepas menerangkan _____

   A. kos melepaskan barang kedua terbaik.
   B. kos tetap yang dilibatkan dalam jangka masa pendek.
   C. kos yang berkaitan dengan tingkat pengeluaran optimum.
   D. harga yang perlu dibayar untuk menggunakan satu faktor pengeluaran.

4. Makroekonomi merupakan satu cabang ekonomi yang melihat _____

   A. keseluruhan ekonomi.
   B. satu firma sahaja.
   C. individu.
   D. semua firma.

5. Mengapakah kerajaan perlu campur tangan dalam ekonomi?

   A. Kerajaan mempunyai kuasa monopoli.
   B. Kerajaan mempunyai kepentingan dalam sektor tertentu.
   C. Kerajaan ingin mengatasi kelemahan sistem pasaran bebas.
   D. Kerajaan ingin berkongsi keuntungan dengan sektor swasta.

6. Antara berikut, yang manakah **bukan** kebaikan sistem ekonomi pasaran bebas?

   A. Kecekapan ekonomi dapat dicapai.
   B. Mengutamakan kebajikan masyarakat.
   C. Keputusan ekonomi dapat dibuat dengan cepat.
   D. Menggalakkan perkembangan teknologi dan inovasi.

[Lihat Sebelah

7.   Maksud permintaan dalam perspektif ekonomi ialah _____

     A.   kemahuan untuk membeli barang dan perkhidmatan pada tingkat harga tertentu.
     B.   kesanggupan individu untuk membelanjakan pendapatan yang ada untuk membeli barang dan perkhidmatan.
     C.   kemahuan semua individu dalam pasaran untuk membeli barang dan perkhidmatan pada tingkat harga tertentu.
     D.   keinginan individu untuk mendapatkan barang dan perkhidmatan serta disokong oleh kemampuan untuk membayar pada tingkat harga tertentu.

8.   Jika fungsi bagi sesuatu barang berubah dari $P = 10 - 0.2Q$ ke $P = 7 - 0.3Q$, ini bermakna _____

     A.   permintaan barang tersebut telah bertambah.
     B.   permintaan barang tersebut telah berkurang.
     C.   penawaran barang tersebut telah bertambah.
     D.   penawaran barang tersebut telah berkurang.

9.   Diandaikan faktor-faktor lain tidak berubah, kenaikan harga kamera akan menyebabkan keluk permintaan filem _____

     A.   tidak berubah.
     B.   beralih ke kiri.
     C.   beralih ke kanan.
     D.   menjadi lebih curam.

10.   Apabila harga barang A naik, permintaan terhadap barang B meningkat, manakala permintaan terhadap barang C berkurang. Apakah hubungan antara barang A, B dan C?

     A.   Barang A merupakan barang pengganti B dan barang penggenap C.
     B.   Barang A merupakan barang penggenap B dan barang pengganti C.
     C.   Barang A merupakan barang pengganti bagi kedua-dua barang B dan C
     D.   Barang A merupakan barang penggenap bagi kedua-dua barang B dan C.

11.   Keluk permintaan sesuatu barang akan beralih ke kiri apabila _____

     A.   jumlah penduduk bertambah.
     B.   harga barang pengganti naik.
     C.   harga barang penggenap naik.
     D.   pendapatan pengguna meningkat.

12.   Apakah kesan terhadap tingkat harga dan kuantiti keseimbangan ayam apabila berlaku kemajuan teknologi dalam industri penangkapan ikan?

     A.   Harga ayam naik dan kuantiti keseimbangan ayam berkurangan.
     B.   Harga ayam jatuh dan kuantiti keseimbangan ayam berkurangan.
     C.   Harga ayam naik dan kuantiti keseimbangan ayam tidak berubah.
     D.   Harga ayam tidak berubah dan kuantiti keseimbangan ayam meningkat.

13.   Di sepanjang keluk permintaan yang bercerun negatif, apabila harga jatuh maka
       _____

       A.   keanjalan permintaan harga adalah sifar.
       B.   keanjalan permintaan harga adalah infiniti.
       C.   keanjalan permintaan harga adalah meningkat.
       D.   keanjalan permintaan harga akan berkurangan.

Soalan 14 adalah berdasarkan Rajah di bawah.

14.   Berasaskan rajah di atas, permintaan bagi barang berkenaan adalah
       _____

       A.   Anjal
       B.   Anjal uniti
       C.   Anjal sempurna
       D.   Tidak anjal sempurna

Soalan 15 adalah berdasarkan Jadual di bawah:

Harga barang (RM)	Penawaran (kg)
5	700
6	800

15.   Jadual di atas menunjukkan penawaran bagi barang X. Jika harga meningkat
       dari RM5 ke RM6, apakah keanjalan penawarannya? (gunakan kaedah mengira
       keanjalan titik tengah/purata dan kalkulator untuk mendapatkan jawapan yang
       tepat)

       A.   0.75   C.   0.73
       B.   0.71   D.   0.9

                                                                    [Lihat Sebelah

16.   Jika perubahan harga sebanyak 2% mengakibatkan perubahan sebanyak 10% dalam kuantiti yang diminta, nilai keanjalan permintaan ialah _____

A.   7.0   C.   0.2
B.   20   D.   5.0

17.   Permintaan pengguna untuk sesuatu barangan boleh diterangkan menggunakan konsep utiliti marginal semakin berkurangan. Konsep ini menerangkan _____.

A.   Apabila pendapatan semakin besar, pengguna mempunyai semakin kurang kehendak untuk dipenuhi.
B.   Pengguna mencapai jumlah utiliti yang berkurangan akibat peningkatan penggunaan barang melebihi suatu tingkat tertentu.
C.   Apabila penggunaan sesuatu barang itu meningkat, jumlah kepuasan pengguna akan meningkat juga tetapi dalam kadar yang semakin berkurangan.
D.   Pengguna akan meningkatkan penggunaan sesuatu barang sehingga tingkat di mana utiliti marginal daripada tambahan penggunaan adalah bersamaan dengan sifar.

Soalan 18 adalah berdasarkan Jadual di bawah:

Unit barang	Jumlah Utiliti		
	A	B	C
1	21	7	23
2	41	13	40
3	59	18	52
4	74	22	60
5	85	25	65
6	91	27	68
7	91	28	70

18.   Jika harga barang A, B dan C ialah RM5.00, RM1.00 dan RM4.00, apakah kombinasi barang A, B dan C yang akan dibeli oleh pengguna jika pendapatannya sebanyak RM37.00 bagi memaksimumkan kepuasannya?

A.   2 A, 3 B dan 6 C
B.   4 A, 5 B dan 3 C
C.   4 A, 3 B dan 5 C
D.   Tiada jawapan

19.   Perubahan tingkat harga yang menyebabkan perubahan dalam kuantiti diminta adalah akibat daripada kesan _____

A.   ekonomi bidangan.
B.   dalaman dan luaran.
C.   lebihan dan kurangan.
D.   penggantian dan pendapatan.

[Lihat Sebelah

Soalan 20 adalah berdasarkan Rajah di bawah.

20.   Dalam rajah di atas, garis PQ mewakili garis belanjawan untuk seorang pengguna apabila pendapatan yang diperolehinya adalah RM20.00 sehari. Pada mulanya, seunit barang X berharga RM2.00, manakala seunit barang Y pula berharga RM1.25. Garis RS mewakili garis belanjawan yang baru apabila pendapatannya meningkat menjadi RM30.00 sehari dan _____

A. barang X berharga RM3.00 seunit dan barang Y berharga RM2.50 seunit.
B. barang X berharga RM1.50 seunit dan barang Y berharga RM2.00 seunit.
C. barang X berharga RM1.80 seunit dan barang Y berharga RM1.00 seunit.
D. barang X berharga RM1.50 seunit dan barang Y berharga RM2.50 seunit.

21.   Antara berikut, yang manakah yang **paling tepat** menerangkan konsep kecekapan ekonomi dalam teori pengeluaran?

A.   Kombinasi input yang melibatkan kos malar.
B.   Kombinasi input yang melibatkan kos minimum.
C.   Kombinasi input yang dapat memaksimumkan kuantiti output.
D.   Kombinasi input yang melibatkan kos yang semakin berkurangan.

22.   Jadual di bawah menunjukkan kuantiti output yang dikeluarkan pada pelbagai tingkat buruh.

Kuantiti Buruh	Output
2	80
3	76
4	70
5	66

Pada tingkat buruh 3, keluaran purata ialah _____

A.   20.4 unit   C.   25.3 unit
B.   23.5 unit   D.   28.3 unit

[Lihat Sebelah

23. Jadual di bawah menunjukkan pelbagai kuantiti penggunaan buruh dalam sesuatu kegiatan pertanian.

Kuantiti Buruh	Situasi Keluaran Purata (AP) dan Keluaran Sut (MP)
P	MP mencapai tahap maksimum dan lebih besar daripada AP
Q	AP mencapai tahap maksimum dan sama dengan MP
R	AP lebih besar daripada MP dan MP adalah sifar
S	AP lebih besar daripada MP yang negatif

Pengeluar yang rasional akan menggunakan kuantiti buruh _____

- A. antara Q dengan R.
- B. antara P dengan Q.
- C. antara R dengan S.
- D. kurang daripada P.

24. Kos tetap bagi sebuah firma ditakrifkan sebagai kos yang _____

- A. berkadar berubah terhadap output.
- B. wujud walaupun output pada jangka pendek adalah sifar.
- C. berpadanan dengan input yang dibeli oleh firma itu pada harga tetap.
- D. hanya wujud apabila kapasiti pengeluaran digunakan dengan sepenuhnya.

25. Kenyataan manakah yang **paling tepat** menerangkan konsep bayaran pindahan?

- A. Bayaran yang dipindahkan daripada individu ke individu lain.
- B. Bayaran dari kerajaan kepada individu.
- C. Bayaran yang diberi sebagai bantuan kepada orang-orang miskin.
- D. Bayaran yang diterima tanpa sumbangan yang seimbang terhadap pengeluaran.

26. Keluaran Dalam Negara Kasar (KDNK) adalah termasuk _____

- A. semua barang dan perkhidmatan yang dihasilkan untuk kegunaan sendiri.
- B. semua barang dan perkhidmatan yang dihasilkan dan dinilai pada harga tahun asas.
- C. semua barang dan perkhidmatan yang dihasilkan di dalam sempadan sesebuah negara.
- D. masa lapang, tetapi tidak termasuk barang dihasilkan oleh sektor isi rumah untuk kegunaan sendiri.

27. Salah satu cara mengira KDNK adalah dengan menjumlahkan _____

- A. penggunaan, upah, kadar bunga, pendapatan sewa dan eksport.
- B. pelaburan, penggunaan, untung syarikat dan eksport bersih.
- C. penggunaan, pelaburan, perbelanjaan kerajaan dan eksport bersih.
- D. upah, untung syarikat, pelaburan bersih dan penggunaan.

28. Dalam pengiraan KDNK, susutnilai adalah _____

    A.   diambilkira dalam pendekatan pendapatan atau perbelanjaan.
    B.   diambilkira dalam pendekatan pendapatan.
    C.   diambilkira dalam pendekatan perbelanjaan.
    D.   tidak diambilkira dalam sama ada pendekatan pendapatan atau perbelanjaan.

29. Perkara yang membezakan Keluaran Negara Kasar pada harga pasaran (KNK_{hp}) dengan Keluaran Negara Kasar pada harga faktor (KNK_{hf}) ialah _____

    A.   cukai tak langsung dan susut nilai.
    B.   cukai tak langsung dan subsidi.
    C.   cukai langsung dan susut nilai.
    D.   cukai langsung dan subsidi.

30. Pendapatan boleh guna adalah _____

    A.   pendapatan yang hanya sementara dan jumlahnya akan berkurangan di masa hadapan.
    B.   pendapatan yang boleh digunakan oleh isi rumah bagi tujuan bayar cukai, belanja atau tabungan.
    C.   pendapatan selepas ditolak cukai dan boleh digunakan oleh isi rumah bagi tujuan belanja atau tabungan.
    D.   pendapatan sebelum ditolak cukai dan boleh digunakan oleh isi rumah bagi tujuan belanja atau tabungan.

SOALAN TAMAT

Appendix A (ii)	Academic Achievement Test for PEA3063 (Mid-intervention)

Bahagian A: Jawab Semua Soalan

1. Berdasarkan kepada pemahaman anda, senaraikan faktor-faktor demografi yang memberi kesan atau penentu kepada perubahan dalam sesebuah populasi?

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2. Demografi adalah suatu pendidikan saintifik berkaitan dengan kelompok manusia. Berdasarkan takrif ini, berikan kepentingan ilmu demografi ini dalam bidang sosial, ekonomi, kemasyarakatan dan negara.

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Bahagian B: Jawab Semua Soalan

1. Pespektif Malthus menerangkan bahawa populasi meningkat secara geometrik manakala bekalan makanan meningkat secara arithmetik. Terangkan maksud perspektif Malthus di atas dan jelaskan kesan perspektif ini kepada populasi di Malaysia.

2. Kesuburan merujuk kepada bilangan anak yang mampu dilahirkan oleh wanita. Berdasarkan takrifan ini, jelaskan kebaikan mempunyai kesuburan yang tinggi di Malaysia.

3. Kelanjutan Usia merupakan keupayaan untuk terus hidup daripada satu tahun ke tahun yang berikutnya @ keupayaan untuk terus hidup. Berdasarkan takrifan ini, jelaskan faktor-faktor sosial yang boleh menyumbangkan kepada kelanjutan usia.

SOALAN TAMAT

Appendix A (iii)	Academic Achievement Test for PEA3063 (Post-Test)

Bahagian ini mengandungi 30 soalan objektif. Setiap soalan diikuti dengan empat pilihan jawapan. Pilih satu jawapan yang terbaik dan lorekan di atas kertas jawapan (OMR) yang disediakan.

Anda dinasihatkan supaya memperuntukkan masa 45 minit bagi menjawab bahagian ini.

D20071029603

1. Konsep kos lepas adalah berdasarkan kepada prinsip
   - A keperluan.
   - B penggunaan.
   - Ⓒ kekurangan.
   - D kehendak.

2. Yang manakah antara berikut adalah benar mengenai masalah kekurangan sumber.
   - A Masalah kekurangan sumber tidak wujud di negara kaya.
   - B Masalah kekurangan sumber hanya wujud di negara miskin.
   - Ⓒ Masalah kekurangan sumber menyebabkan wujudnya pilihan.
   - D Masalah kekurangan sumber menyebabkan wujudnya kehendak tidak terhad.

3. Rajah di bawah menunjukkan keluk kemungkinan pengeluaran sebuah negara.
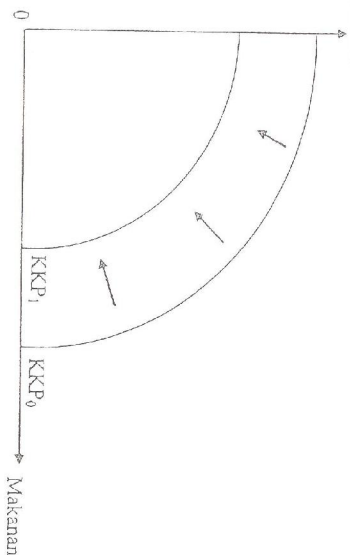
   Keluk kemungkinan pengeluaran beralih ke kiri **bukan** disebabkan oleh
   - A kematian ramai penduduk.
   - B kerosakan sumber alam.
   - Ⓓ kemusnahan teknologi terkini

4. Jadual berikut menunjukkan hubungan antara harga barang X dengan kuantiti diminta barang Y.

Harga (Barang X)	Kuantiti Diminta (Barang Y)
RM 10.00	15 unit
RM 20.00	20 unit

   Berpandukan jadual di atas, hubungan antara barang X dan barang Y ialah
   - Ⓐ barang pengganti.
   - B barang penggenap.
   - C barang tidak berkaitan.
   - D barang mewah.

5. Andaikan permintaan terhadap barang X adalah anjal sempurna. Jika 500 unit dibeli pada harga RM3.00, berapakah kuantiti yang akan dibeli oleh pengguna jika harga naik ke RM5.00?
   - A 2 500 unit
   - Ⓑ 1 500 unit
   - C 500 unit
   - D 0 unit

6. Keanjalan penawaran bagi komputer riba ialah 2.5. Jika penjual bercadang untuk meningkatkan keluaran komputer riba sebanyak 50%, penjual perlu
   - A menaikkan harga 20%.
   - Ⓑ menurunkan harga 20%.
   - C menaikkan harga 125%.
   - D menurunkan harga 125%.

7. Jika perubahan dalam harga menyebabkan perubahan yang lebih besar dalam kuantiti diminta, keanjalan permintaan harga adalah
   - Ⓐ anjal.
   - B kurang anjal.
   - C anjal sempurna.
   - D tidak anjal sempurna.

8. Permintaan beras untuk Ali ialah 50 kg sebulan. Sekiranya harga beras meningkat 20%, berapakah kuantiti pembelian beras oleh Ali selepas kenaikan harga ini jika keanjalan permintaan harga ialah - 0.80.

   A   40 kg sebulan.
   B   42 kg sebulan.
   C   50 kg sebulan.
   D   58 kg sebulan.

9. Walaupun harga udang galah sungai meningkat sebanyak 50%, namun kuantiti yang ditawarkan bagi udang galah tersebut kekal pada kuantiti asal. Ini bererti, nilai keanjalan penawaran harga bagi udang galah jiu adalah

   A   anjal uniti.
   B   anjal.
   C   tidak anjal sempurna.
   D   anjal sempurna.

10. Peralihan keluk permintaan ke kanan yang lebih besar daripada peralihan keluk penawaran ke kanan secara serentak akan menyebabkan

    A   kuantiti dan harga keseimbangan turun.
    B   kuantiti dan harga keseimbangan naik.
    C   kuantiti keseimbangan naik dan harga keseimbangan turun.
    D   kuantiti keseimbangan turun dan harga keseimbangan naik.

11. Lebihan pengguna wujud apabila tahap kesanggupan membayar oleh pengguna

    A   lebih besar daripada tingkat harga pasaran.
    B   lebih kecil daripada tingkat harga pasaran.
    C   menyamai tingkat harga pasaran.
    D   tidak dipengaruhi oleh tingkat harga pasaran.

12. Dalam menghadapi pilihan antara epal dan pisang, jumlah pisang yang sanggup ditukarkan untuk sebiji epal dikenali sebagai

    A   nilai utiliti sut epal dalam sebutan pisang.
    B   nilai utiliti sut pisang dalam sebutan epal.
    C   permintaan bagi epal.
    D   kesan penggantian antara epal dan pisang.

13. Hukum utiliti sut berkurangan menyatakan

    A   semakin kurang sesuatu barang digunakan, semakin kurang utiliti sut yang diperolehi.
    B   semakin banyak sesuatu barang digunakan, semakin tinggi utiliti sut diperolehi.
    C   semakin banyak sesuatu barang digunakan, semakin kurang utiliti sut yang diperolehi.
    D   semakin banyak sesuatu barang digunakan, semakin kurang jumlah utiliti yang diperolehi.

14. Pengguna akan berada dalam keadaan keseimbangan apabila

    A   utiliti sut per ringgit daripada unit akhir setiap unit barang yang dibeli adalah sama.
    B   utiliti sut daripada unit akhir setiap barang yang dibeli adalah sama.
    C   jumlah ringgit yang dibelanjakan daripada setiap barang yang dibeli adalah sama.
    D   jumlah utiliti per ringgit yang diperolehi daripada setiap unit barang yang dibeli adalah sama.

15. Jika utiliti sut per ringgit barang X kurang daripada utiliti sut per ringgit barang Y, pengguna boleh memaksimumkan kepuasan jika membeli

    A   lebih barang X dan kurang barang Y.
    B   lebih barang X dan lebih barang Y.
    C   kurang barang X dan kurang barang Y.
    D   kurang barang X dan lebih barang Y.

16. Campur tangan kerajaan dalam ekonomi mempunyai tujuan berikut, kecuali

    A   menyediakan barangan awam.
    B   mengelakkan amalan monopoli.
    C   menghapuskan kesan eksternaliti negatif.
    D   meluaskan jurang pendapatan masyarakat.

17. Pelaksanaan dasar harga maksimum akan menyebabkan lebihan pengguna

    A   berkurang
    B   bertambah.
    C   tidak berubah.
    D   mendekati infiniti.

18. Rajah di bawah menunjukkan dua (2) garis belanjawan PQ dan RS bagi seorang pengguna.
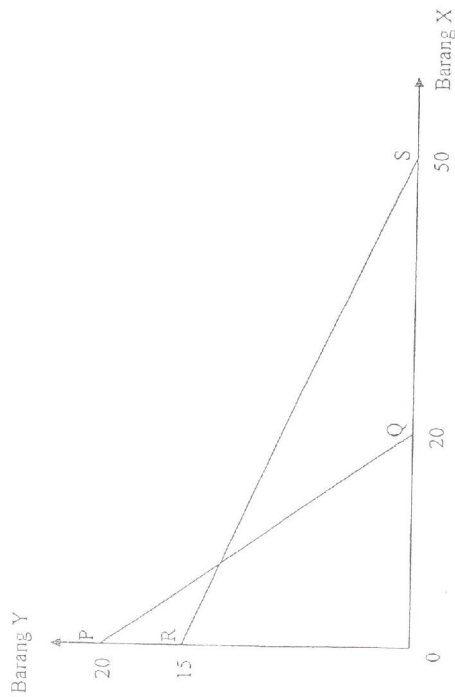
Barang Y

Apakah peratus perubahan kuantiti bagi barang X atau barang Y yang maksimum boleh dibeli jika garis belanjawan yang baru adalah RS dan pendapatan pengguna tidak berubah?

A   Kuantiti barang X bertambah 25% manakala kuantiti barang Y berkurang 150%.

B   Kuantiti barang X berkurang 25% manakala kuantiti barang Y bertambah 150%.

C   Kuantiti barang X bertambah 30% manakala kuantiti barang Y berkurang 60%.

D   Kuantiti barang X berkurang 30% manakala kuantiti barang Y bertambah 60%.

19. Hukum pulangan berkurangan digunakan untuk menerangkan bentuk keluk

A   kos sut jangka pendek.

B   kos sut jangka panjang.

C   kos purata jangka panjang.

D   kos tetap jangka pendek.

20. Apabila jumlah keluaran maksimum

A   keluaran purata dan keluaran sut adalah sifar.

B   keluaran sut adalah positif tetapi keluaran purata adalah sifar.

C   keluaran sut adalah sifar tetapi keluaran purata adalah positif

D   keluaran purata dan keluaran sut adalah positif

21. Sebuah firma **tidak** beroperasi dalam jangka pendek apabila harga adalah

A   lebih rendah daripada kos berubah purata.

B   sama dengan kos berubah purata.

C   lebih tinggi daripada kos berubah purata.

D   sama dengan kos purata.

22. Perkara berikut menyebabkan kos purata jangka panjang firma menurun di sepanjang keluk apabila keluarannya ditambah. **kecuali**

A   tenaga buruh mahir dibekalkan oleh institut latihan buruh.

B   kecekapan buruh akibat melakukan kerja yang berulang-ulang.

C   penggunaan mesin ditingkatkan pada kapasiti sepenuhnya.

D   kejayaan jabatan penyelidikan dan pembangunan firma.

23. Apabila keluk kos sut menyamai keluk kos berubah purata, keluk

A   kos berubah purata sedang meningkat.

B   kos purata mencapai titik minimum.

C   kos berubah purata mencapai titik minimum.

D   kos purata sedang meningkat.

24 Rajah di bawah menunjukkan keluk kos dan hasil bagi sebuah firma.
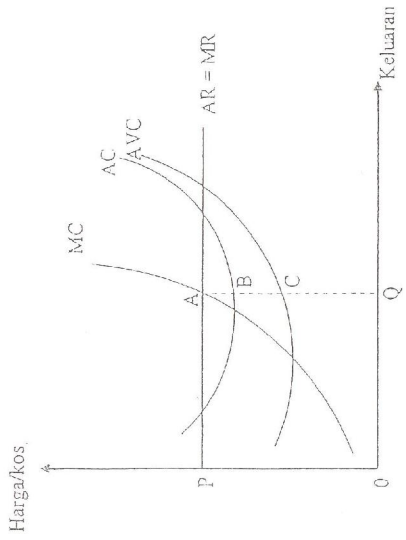
Berdasarkan rajah di atas, untung seunit keluaran firma pada tingkat keseimbangan ialah

(A) AB
B AC
C AQ
D BC

25 Rajah di bawah menunjukkan keluk jumlah hasil (TR) sebuah firma monopoli.
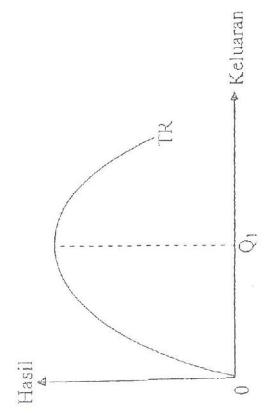
Berdasarkan rajah di atas, pilih pernyataan yang benar?

A Pada kuantiti $0Q_1$, kenaikan harga menyebabkan TR meningkat.
B Pada kuantiti $0Q_1$, kenaikan harga menyebabkan TR tidak berubah.
(C) Pada kuantiti $0Q_1$, kenaikan harga menyebabkan TR menurun.

26 Sebuah negara yang menggalakkan kewujudan monopoli, kebebasan dari persaingan antara firma serta membolehkan kepuasan individu yang maksimum merupakan sistem ekonomi

A Islam.
B campuran.
(C) pasaran bebas.
D perancangan pusat.

27 Struktur pasaran manakah yang paling sukar dimasuki?

A Pasaran persaingan sempurna.
(B) Pasaran monopoli.
C Pasaran oligopoli.
D Pasaran persaingan bermonopoli.

28 Keluk penawaran firma pasaran persaingan sempurna dalam jangka pendek merupakan keluk kos sut bercerun ke atas dari kiri ke kanan bermula dari titik minimum

A keluk tetap purata.
(B) keluk kos sut.
C keluk kos berubah purata.
D keluk kos purata.

29 Dalam jangka pendek, firma pasaran persaingan bermonopoli boleh memperolehi untung lebih normal dengan cara

A meningkatkan harga.
B menambahkan perbelanjaan iklan.
(C) mengurangkan penawaran.
D meningkatkan penggunaan teknologi.

30 Sekiranya dalam jangka pendek firma pasaran persaingan sempurna mendapat untung lebih normal, dalam jangka panjang tidak berlaku

(B) kemasukan firma dari industri lain.
B kenaikan harga pasaran.
C pertambahan penawaran industri.
D untung normal.

Bahagian A: Jawab Semua Soalan

1. Jelaskan dengan fakta bagaimana pekan Tanjong Malim mampu menjadi tumpuan penduduk (migrasi) di Malaysia. Senaraikan kesan-kesan negatif yang akan berlaku jika migrasi masuk ke Tanjong Malim berlaku secara besar-besaran tanpa kawalan?

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2. Pada pendapat anda, mengapa umur kaum lelaki lebih rendah berbanding kaum wanita di Malaysia. Terangkan beserta dengan fakta.

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3. Bagaimanakah proses urbanisasi (perbandaran) boleh memberi kesan negatif kepada kehidupan manusia.

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4. Jelaskan dengan bukti yang kukuh berkaitan dengan faktor-faktor yang menyumbang kepada pertambahan golongan-golongan tua di kebanyakkan negara-negara maju. Senaraikan juga kesan-kesan positif pertambahan golongan warga tua ini kepada pertumbuhan ekonomi dan sosio negara.

SOALAN TAMAT

Appendix B	PBL Self-Assessment Questionnaires

Educational and Professional Studies
University of Strathclyde
Jordanhill Campus
Glasgow
United Kingdom

Soalselidik Penilaian Terhadap Pembelajaran-Berasaskan Masalah
Problem-Learning Assessment Questionnaires

Ini adalah satu soal selidik untuk mengumpul maklumat berkenaan dengan pendapat dan penilaian anda terhadap kaedah pembelajaran berasaskan masalah (PBL). Tuliskan jawapan anda pada ruang berkaitan. Jawapan yang tepat dan jujur amat dihargai. Segala maklumat adalah sulit dan hanya akan digunakan untuk kajian ini sahaja. Kerjasama anda didahului dengan ucapan ribuan terima kasih.

The objectives of this questionnaire are to gather information about your opinion and assessment regarding Problem-based Learning. Please write your answer in the space provided. I would appreciate accurate and honest answers. All the information is confidential and it will be used only for research purposes. Thanks for your cooperation.

Matrik/*Matric Number :*_____

I. Anda dan pembelajaran berasaskan masalah (PBL)/ *problem-based learning and you*

Berikut adalah beberapa pernyataan berkaitan dengan cara belajar Dasar Ekonomi dan Kependudukan yang anda telah ikuti. Baca tiap-tiap pernyataan dengan teliti. Tentukan sejauh mana anda meminati cara belajar ini dengan membulatkan satu angka sama ada / *The following statements relate to the type of learning method for Population Economics and Policy. Please circle the number representing your views about the type of learning method:*

1	2	3	4	5
Sangat tidak setuju/*Strongly disagree*	Tidak Setuju/*Disagree*	Tidak Pasti/*Not sure*	Setuju/*Agree*	Sangat Setuju/*Strongly agree*

1. Belajar cara ini adalah lebih susah / *This type of learning is difficult*   1   2   3   4   5

2. Saya suka belajar berdasarkan masalah berbanding duduk dan mendengar kuliah dari pensyarah / *I enjoyed working on these problems more than listening to a lecture.*

    1   2   3   4   5

3. Saya suka belajar cara ini / *I like this learning method*

    1   2   3   4   5

4. Saya lebih faham belajar fakta-fakta dasar ekonomi dan populasi dengan cara ini / *I gain more understanding about the basics of economics and population with this method*

    1   2   3   4   5

5. Saya lebih ingat fakta-fakta dasar ekonomi dan populasi dengan cara ini / *I can memorise the facts of economics and population through this method*

    1   2   3   4   5

6. Saya suka aktiviti perbincangan / *I like the discussion activities*

    1   2   3   4   5

7. Saya lebih memahami mengenai penyelesaian masalah melalui kaedah PBL / *I understand more about problem solving using the PBL method.*

    1   2   3   4   5

8. Saya merasakan penyampaian kuliah oleh pensyarah lebih efektif untuk mempelajari idea-idea kompleks berbanding kaedah PBL / *I feel that the lecture from the lecturer is a more effective way to learn complex ideas than PBL.*

    1   2   3   4   5

9. Walaupun kaedah belajar cara ini baru kepada saya, saya lebih menyukainya berbanding kuliah biasa / *Although this method is a new process for me, I like this alternative of learning more than lecture.*

    1   2   3   4   5

10. Saya suka aktivit yang mencabar otak / *I like the brain challenging activities.*

    1   2   3   4   5

11. Kefahaman bertambah melalui aktiviti penyelesaian masalah bersama / *The knowledge is improved through problem solving group activities.*

    1   2   3   4   5

12. Belajar melalui penyelesaian masalah menyeronokkan / *Learning through problem solving is fun.*

    1   2   3   4   5

13. Minat terhadap dasar ekonomi dan populasi bertambah melalui aktiviti penyelesaian masalah / *The interest in economics and population was increased through problem solving activities.*

    1   2   3   4   5

14. Saya merasakan PBL mengajar saya pendekatan bagaimana untuk menyoal secara logik / *I feel that PBL has taught me how to approach questions in a logical manner.*

1	2	3	4	5

15. PBL mengajar saya bagaimana membuat keputusan secara logik / *I feel that PBL has taught me how to make logical decisions.*

1	2	3	4	5

16. Saya belajar bagaimana untuk mempertahankan jawapan dan maklumat yang diperolehi melalui PBL/ *Through PBL I learned how to defend my answer and information.*

1	2	3	4	5

17. Saya belajar bagaimana untuk menilai maklumat secara kritikal dan tidak terlalu cepat dalam membuat keputusan / *Through PBL I learned how to critically evaluate information and not be too quick to jump to conclusions.*

1	2	3	4	5

18. Maklumat yang saya perolehi melalui subjek lain membantu saya untuk membuat keputusan logik / *I feel that I am able to use knowledge gained in other courses to help me reach logical conclusions.*

1	2	3	4	5

19. Kebolehan saya membuat keputusan logik meningkat kesan penggunaan PBL / *Through PBL, I feel that my ability to reach logical conclusion has improved.*

1	2	3	4	5

20. Kebolehan saya berfikir secara logik berkaitan permasalah meningkat kesan dari penggunaan PBL / *Through PBL, I feel that my ability to think critically about the problems has improved.*

1	2	3	4	5

21. Saya merasa takut bagaimana untuk mencari maklumat untuk menyelesaikan kuliah masalah berbanding hanya mendengar penjelasan melalui kuliah / *I felt more anxious about having to seek information for the problems than I did listening to a lecture.*

1	2	3	4	5

22. Aktiviti mencari maklumat secara individu dapat menfokuskan kepada fakta penting / *The search for facts through individual activities can help us to focus on important facts*

1	2	3	4	5

23. Saya merasakan saya lebih belajar melalui kuliah berbanding apa yang saya lakukan melalui PBL / *I feel that I would have learned more in a lecture setting than I did with PBL.*

1	2	3	4	5

24. Aktiviti perbincangan dapat mengukuhkan kefahaman terhadap pelajaran / *The discussion activities can improve the understanding of lesson.*	1	2	3	4	5
25. Dengan belajar cara ini, saya boleh membuat pernyataan hipotesis dengan baik / *Through this learning method, I can make a better hypothesis statement.*	1	2	3	4	5
26. Saya dapat mempertajamkan kemahiran bernilai dalam kerjaya akademik melalui PBL / *I have developed skills that will useful to me in my academic career.*	1	2	3	4	5
27. Saya dapat mempertajamkan kemahiran bernilai dalam kerjaya masa depan melalui PBL / *I have developed skills that useful to me in my future career.*	1	2	3	4	5
28. Melalui PBL saya dapat meningkatkan kemahiran pencarian maklumat (artikel penyelidikan, buku-buku rujukan, teks rujukan dan sebagainya) di luar bilik kuliah / *Through PBL I learned how to search for information (research articles, reference books, textbooks, etc) outside the lecture room.*	1	2	3	4	5
29. Melalui PBL saya dapat belajar di mana untuk mencari maklumat yang tepat / *Through the PBL method, I learned where to search for accurate information.*	1	2	3	4	5
30. Saya berpendapat bahawa aktiviti penyelesaian masalah telah memberikan saya peluang untuk memahami / *I think the problem solving activities give me the chance to understand;*					
a. Menganalisa / *Analysis*	1	2	3	4	5
b. Menilai / *Evaluation*	1	2	3	4	5
c. Inferens / *Inference*	1	2	3	4	5
d. Pemikiran deduktif / *Deductive reasoning*	1	2	3	4	5
e. Pemikiran induktif / *Inductive reasoning*	1	2	3	4	5
31. Kemahiran insaniah (pemikiran, komunikasi, kerja kumpulan dan sebagainya) meningkat melalui proses PBL / *Through PBL, my soft skills (thinking, communication, group work, etc) improved as a result of the PBL process.*	1	2	3	4	5

32. Saya lebih berfikir daripada menghafal / *I rely more on my thinking skills compare to memorization* 1 2 3 4 5

33. Masalah yang dikemukakan dalam proses PBL memotivasikan saya untuk belajar dan memahami / *The problems in PBL process have motivated me to study and to learn.* 1 2 3 4 5

34. Sikap saya terhadap pembelajaran meningkat kesan daripada permasalahan yang dikemukakan / *My attitude towards learning improved as a result of these problems.* 1 2 3 4 5

35. Mencari maklumat untuk penyelesaian masalah melalui PBL mendorong saya untuk berjaya / *My drive to succeed was enhanced because I was motivated to find the answer to these problems.* 1 2 3 4 5

36. Secara keseluruhannya, saya akan mendaftar dalam kursus lain yang menggunakan PBL jika diberi peluang / *Overall, I would enrol in another PBL course if given the opportunity.* 1 2 3 4 5

37. Sila nyatakan cadangan anda untuk memperbaiki kaedah pembelajaran berasaskan masalah (PBL) yang anda telah alami / *Please give your opinion to improve the problem-based learning method that you have already experienced*

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Appendix C	Students Background Questionnaires

Maklumat latar belakang siswa/i / *Information of undergraduate background*

Soal selidik ini ditujukan kepada para siswa/i Semester 1 Sesi 2010/2011 yang mengikuti pelajaran PEA3063 – Dasar Ekonomi dan Kependudukan. Maklumbalas kepada semua pernyataan adalah sulit dan hanya akan digunakan untuk kajian ini sahaja. Ucapan terima kasih didahulukan untuk kerjasama anda / *This questionnaire is targeted for undergraduates registered in PEA3063 – Economics, Population and Policy in Semester 1, 2010/2011. All the information is confidential and it will be used only for research purposes. Thanks for your cooperation..*

Sila lengkapkan maklumat latar belakang anda/*please complete your background*

1. Major : _____   Minor : _____

2. Jantina/*gender*   Lelaki/*male*   ☐

     Perempuan/*female*   ☐

3. Gred yang dicapai untuk subjek berkaitan Ekonomi yang telah anda duduki sepanjang menuntut di UPSI/ *Higher grade achived in Economics subject that you have already taken within your study in UPSI.*

	Gred/ *Grade*
PEA1013 Macroeconomic for Education	☐
PEA1023 Microeconomics for Education	☐
PEA2023 Mathematics for Economics	☐
PEA2013 Inter. Macroeconomic for Education	☐
PEA2043 Inter. Microeconomics for Education	☐
PEA3013 Management Economics	☐
PEG2013 Developmental Economics	☐
PEA3023 International Economics	☐
PEA3033 Econometric	☐
PEA3043 Islamic Economics	☐
PPE3043 Teaching Method for Economics	☐
PEA4023 Monetary Economics	☐

4. Bagaimanakah anda mempelajari mata pelajaran PEA3063 – Dasar Ekonomi dan Kependudukan? Sila tandakan pada petak yang disediakan / *How did you learn PEA3063 – Population Economics and Policy?| Please your answer in the box provided.*

Daripada pensyarah/ *from lecture*	
Daripada ahli keluarga/ *from family members*	
Daripada rakan/ *from peers*	
Pusat tuisyen/ *tuition centre*	
Belajar sendiri/ *self-learning*	
Daripada rancangan TV/ *from TV programmes*	
Daripada majalah/ *from magazines, journals etc*	
Internet	

5. Nyakatakan sejauhmanakah anda telah didedahkan dengan kemahiran berfikir kritis sepanjang mempelajari modul PEA3063 – Dasar Ekonomi dan Kependudukan menggunakan kaedah PBL? / *Explain how far you understand about the critical thinking skills during the implementation of the module PEA3063 – Economics, Population and Policy through PBL method?*

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6. Nyatakan pendapat anda mengenai mata pelajaran PEA3063 – Dasar Ekonomi dan Kependudukan yang sedang anda pelajari di universiti melalui kaedah PBL/*State your opinion about the PEA3063 – Population Economics and Policy that you learn in this class through the PBL method.*

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Appendix D	Lecturer Questionnaires

Temu bual dan soal selidik terbuka Pensyarah / *Interview and open-ended questionnaires with lecturer*

Soal selidik ini ditujukan kepada pensyarah Semester 1 Sesi 2010/2011 yang terlibat dalam pengajaran dan pembelajaran PEA3063 – Dasar Ekonomi dan Kependudukan mengenai perkara-perkara berikut berdasarkan pendapat dan pengalaman (dari aspek pengajaran dan pembelajaran kemahiran pemikiran kritikal dan penyelesaian masalah) menggunakan kaedah PBL. Maklumbalas kepada semua pernyataan adalah sulit dan hanya akan digunakan untuk kajian ini sahaja. Ucapan terima kasih didahulukan untuk kerjasama anda / *This questionnaire is targeted for lecturer who involved in teaching PEA3063 – Economics, Population and Policy in Semester 1, 2010/2011 using PBL method. All the information is confidential and it will be used only for research purposes. Thanks for your cooperation.*

1. Perbandingan diantara kaedah P&P konvensional yang biasa anda gunakan dalam kuliah dengan kaedah PBL / *Comparison between your common traditional teaching and learning method and PBL method.*

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2. Masalah, batasan atau kekurangan yang anda hadapi dalam melaksanakan kaedah PBL
   / *The problems, limitations and disadvantages during your implementation of PBL.*

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3. Kebaikan kaedah PBL / *The advantages of PBL.*

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4. Cadangan anda untuk memperbaiki kaedah PBL / *Your suggestion and opinion to improve the PBL method.*

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Appendix E	PEA3063 – Population Economics and Policy Syllabus

UNIVERSITI PENDIDIKAN SULTAN IDRIS

REKA BENTUK KURIKULUM KURSUS DAN PERANCANGAN INSTRUKSI
(CURRICULUM DESIGN AND INSTRUCTIONAL PLAN)

Fakulti	:	PERNIAGAAN DAN EKONOMI/BUSINESS AND ECONOMICS
Jabatan	:	EKONOMI
Semester	:	Semester I
Sesi	:	Sesi 2010/2011
Nama Kursus	:	POPULATION ECONOMICS AND POLICY
Kod Kursus	:	PEA3063
Jenis Kursus	:	Major/Minor
Jam Kredit	:	3 Jam
Prasyarat	:	Tiada

MAKLUMAT PENSYARAH/LECTURER INFO:

Nama/Name	DR. MOHD YAHYA MOHD HUSSIN
E-mail	yahya@upsi.edu.my
No. Telefon	05-4506232
No. Bilik	Perpustakaan Lama

SINOPSIS KURSUS/COURSE SYNOPSIS:

Bahasa Malaysia
Kursus ini membincangkan interaksi antara pembolehubah sosio-ekonomi dengan pembolehubah demografi serta dasar yang mempengaruhi pembolehubah tersebut. Kursus ini turut mengupas teori-teori dan pandangan tokoh-tokoh pemikir terdahulu yang mahir dan terkenal dalam isu kependudukan. Tajuk-tajuk di dalam khusus ini juga meliputi topik seperti teori transisi demografi, teori penurunan mortaliti dan fertiliti, aliran migrasi, pelunjuran penduduk, dasar pembangunan tanah, dasar kependudukan dan Wawasan 2020.

English Vision
This course is discussing the interaction between the social economics variables and the demography variables. It also focuses in any policies that influence in these variables. The topics will discuss further is demography transition, mortality, fertility, land development policies, population policies and Wawasan 2020.

MATLAMAT KURSUS:
Melalui kurus ini pelajar akan dapat membincangkan tentang teori dan amalan dasar dan ekonomi kependudukan serta mengaplikasikannya ke dalam penyediaan kertas tugasan sosio-ekonomi dan demografi di akhir kursusu ini.

OBJEKTIF KURSUS:
Di akhir kursus, pelajar dapat:

1.   Menjelaskan konsep dan teori asas mengenai penduduk dan dapat membina perspektif demografi kendiri.

2.   Menghurai dan menganalisis isu-isu kependudukan yang melanda dunia.

3.   Membezakan persepsi terhadap pembangunan dan perubahan penduduk supaya dapat meningkatkan kesedaran terhadap apa yang berlaku dan punca sebabnya agar dapat menghadapi dugaan di masa depan.

RUJUKAN UTAMA:
John R. Weeks. (2005). Population: An Introduction to Consept and Issues (9th Edition). California: Wadsworth Publishing Company Belmont.

RUJUKAN TAMBAHAN:
Laporan Am Banci Penduduk. (1980). Vol. 1. Kuala Lumpur: Jabatan Perangkaan Malaysia.

Laporan Am Banci Penduduk. (1991). Vol. 1. Kuala Lumpur: Jabatan Perangkaan Malaysia.

Jabatan Perdana Menteri (2001), Unit Perancangan Ekonomi Rancangan Malaysia Ke-8 (2001-2005). Kuala Lumpur:Percetakan Negara.

Lim, L.L. (1983). Population and Development:Thery and Empirical vidence: The Malaysia Case. Kuala Lumpur: International Book Services.

Notkola, V. (2000). Fertality, Mortality and Migration in Subsaharan Africa. Hamshire: MacMillan.

Mahathir Mohamad (1991). Wawasan 2020, "Malaysia: The Way Forward". Kuala Lumpur: Percetakan Negara.

United Nations (1981), Population and Development Modelling, Proceeding of the United Nation/UNFPA Expert Group Meeting. New York: United Nations.

Jurnal-jurnal dan halaman-halaman web yang dicadangkan dalam buku rujukan utama.

KAEDAH PENGAJARAN:
Kuliah, perbincangan, projek berkumpulan, rujukan, internet, "e-learning" dan email.

PENILAIAN PRESTASI PELAJAR:

Tutorial Individu	10%
Ujian Pertengahan Semester	30%
Peperiksaan akhir	60%
Jumlah	<u>100%</u>

PENGGREDAN SKALA UPSI

Gred	Julat Markah	PNG(S/K)	Taraf
A	80 – 100	4.00	Cemerlang
A-	75 – 79	3.70	Cemerlang
B+	70 – 74	3.40	Kepujian
B	65 – 69	3.00	Kepujian
B-	60 – 64	2.70	Kepujian
C+	55 – 59	2.40	Lulus
C	50 – 54	2.00	Lulus
C-	45 – 49	1.70	Lulus Lemah
D+	40 – 44	1.40	Lulus Lemah
D	35 – 39	1.00	Lulus Lemah
F	0 – 34	0	Gagal

JADUAL PENGAJARAN 14 MINGGU

Minggu	Jam	Tajuk Kuliah	Rujukan

1	3	1.0 Pengenalan kepada Demografi
		    1.1 Demografi: Sains kependudukan
		    1.2 Kenapa perlu mempelajari demografi
		    1.3 Pertumbuhan penduduk sedunia sepintas lalu
		    1.4 Kuasa Gandaan - Secepat mana penduduk bertumbuh? Kenapa pertumbuhan masa kini mendadak?
		    1.5 Agihan penduduk sedunia melalui migrasi
		    1.6 Perbezaan saiz dan pertumbuhan penduduk secara global (Negara Membangun dan Negara Sedang Membangun) - Amerika Utara; Eropah; Saharan Africa; Asia.
			John R. Weeks Bab 1-2

2-3	6	2.0 Perspektif Demografi
		    2.1 Doktrin Penduduk Pra – Moden
		    2.2 Perspektif Malthus
		    2.3 Perspektif Marxian
		    2.4 Teori Demografi Transisi
		    2.5 Transisi demografi sebenarnya adalah satu set transisi
			John R. Weeks Bab 3

4	3	3.0 Transisi Kematian
		    3.1 Jangka hayat dan kelanjutan usia
		    3.2 Corak umur dan jantina dalam kematian
		    3.3 Punca-punca kematian
		    3.4 Pengukuran kematian
		    3.5 Transisi kematian/epidemiologi
			John R. Weeks Bab 5

5	3	4.0 Transisi Kesuburan
		    4.1 Apa dia kesuburan?
		    4.2 Pengukuran kesuburan
		    4.3 Syarat penurunan kesuburan
		    4.4 Bagaimana kesuburan boleh dikawal?
		    4.5 Penentu kesuburan
			John R. Weeks Bab 6

		4.6 Penjelasan tentang kesuburan yang tinggi 4.7 Motivasi bagi tahap kesuburan yang rendah 4.8 Bagaimana transisi kesuburan tercapai? 4.9 Perbezaan kawasan dalam transisi kesuburan 4.10 Kajian kes dalam transisi kesuburan	
6	3	5.0 Transisi Migrasi 5.1 Definisi migrasi 5.2 Migrasi dalaman dan antarabangsa 5.3 Pengukuran migrasi 5.4 Transisi migrasi antara negara 5.5 Migrasi antara negara 5.6 Migrasi paksaan	John R. Weeks Bab 7
7	3	6.0 Transisi Umur 6.1 Konsep umur dan kohort umur 6.2 Konsep jantina 6.3 Transisi umur 6.4 Transisi umur dalam pekerjaan	John R. Weeks Bab 8
8	3	7.0 Populasi Penduduk Tua 7.1 Takrifan tua 7.2 Populasi penduduk tua 7.3 Individu tua sebagai faktor populasi tua 7.4 Konteks sosial penduduk tua dan kehidupan 7.5 Struktur jantina dan umur bagi populasi tua	John R. Weeks Bab 9
9	3	8.0 Transisi Keluarga dan Isirumah 8.1 Takrifan demografi keluarga dan peluang kehidupan 8.2 Transisi keluarga dan isirumah 8.3 Penentu perubahan keluarga dan isi rumah 8.4 Perubahan peluang kehidupan 8.5 Pertembungan antara perubahan peluang kehidupan dengan transisi keluarga dan isi rumah	John R. Weeks Bab 10
10	3	9.0 Transisi Urbanisasi 9.1 Apakah itu urbanisasi?	John R. Weeks

		9.2	Secara ringkas berkenaan urbanisasi	Bab 11
		9.3	Penentu transisi urbanisasi	
		9.4	Transisi urbanisasi dalam konteks transisi demografi	
		9.5	Evolusi urbanisasi yang seiring dengan transisi demografi	
		9.6	Bandar sebagai persekitaran yang mampan	
11	3	10.0	Populasi dan Persekitaran	John R. Weeks Bab 12
		10.1	Pembangunan ekonomi – penggunaan dan pembaziran sumber	
		10.2	Bagaimana populasi dikaitkan dengan pembangunan ekonomi?	
		10.3	Dapatkah berbilion penduduk lagi diberi makan?	
		10.4	Kesan pembangunan – kemusnahan kepada alam sekitar	
		10.5	Pembangunan mampan	
12	3	11.0	Menangani Perubahan Demografi	John R. Weeks Bab 13
		11.1	Pembentukan dasar untuk mempengaruhi transisi	
		11.2	Persidangan populasi dunia sebagai alat dasar	
		11.3	Dasar populasi dalam kurun ke-21 – pengurusan transisi	
13 & 14	3	12.0	Demografi Malaysia	
		12.1	Sejarah penduduk di Malaysia	
		12.2	Tren pertambahan penduduk	
		12.3	Piramid penduduk	
		12.4	Agihan dan komposisi mengikut negara, negeri, luar bandar, bandar, umur dan jantina	
		12.5	Tren kematian dan kesuburan	
		12.6	Kaitan penduduk dengan pembangunan ekonomi, pendidikan, kemiskinan, kesihatan, perumahan, dan pendapatan	
		12.7	Dasar Kependudukan - Program kependudukan yang dilancarkan Wawasan 2020	

Appendix F	PBL Cases

<h1>A Students PBL Module and PBL Cases</h1>

What is Problem-Based Learning?

Problem-Based Learning McMaster Model was introduced by Howard Barrows (medical education programmes, McMaster University, Canada) in the early 1969.   Based on this model, Problem-Based Learning involved three main stages:

a)   exposure to the problematic scenario

b)   search for information, and

c)   the discussion and new applications on the problems presented

The learning steps in the Problem-Based Learning consisted of the following:

a)   overview

b)   problems encountered

c)   problem definition

d)   exploration

e)   solution, and

f)   reflection

While the learning steps using the Problem-Based Learning were as outlined below:

a)   The concepts to be learned would be listed

b)   The problems scenario would be presented to all the students (either in the form of images, situations, documents, audio-video, etc.)

c)   In small groups (between 4-5 persons), the students would analyze the information or ideas for the scenarios with the aim of identifying the existing information or ideas, or with a view to increase and search for a new information or ideas. In these steps, the process of brainstorming would be undertaken to allow students to define

the problems and identify the variables which would take on the solution of the problems. In addition to which, students would also be able to identify the learning objectives relevant topic. Afterwards, the assignment or the subsequent action would be allocated between group members for process of seeking and the addition of information and ideas to solve problems.

d)   The student needs to look for information or ideas of reference resources and materials either by further reading, libraries, online research or other methods.

e)   After the information or ideas are obtained and collected using the diverse sources, members of the group would return to discuss and satisfactory consensus the final settlement and thus determine to ensure the learning objectives have been achieved. At the end of the learning session or discussion, reflections would be implemented to identify and verify the effectiveness of the learning for the topic or issues at that week. Throughout the learning sessions, the lecturer or facilitator would be engaged in monitoring and give a cognitive guidance for each group either by face to face sessions, online meetings or others medium that fit by the students and lecturer. In the process of monitoring and cognitive guidance, the lecturer or facilitator with his best efforts would use the questioning techniques on the students with the purpose to make sure the information or idea that was obtained would continue to develop.

In the Problem-Based Learning curriculum there are five phases which must be implemented by the students:

Phase 1 :   Define and Analyze the Problem

Students will form into small groups (contain 5-8 students) and it will be led by facilitator or tutor. After that, all the groups will get a problem scenario (without learning process at early stage). Students must analyze, synthesize, and evaluate to gain a sense of the whole and formulate a viable solution. In this process, students will find a real problem, learning issues or learning objectives regarding to three main problem:

a)   What do you know about this problem?

b)   What did you require to solve this problem efficiently? And

c)   What are the sources did you require to solve this problem or this generated hypothesis? After that, the students must make an action plan to solve this problem.

Phase 2   Find, Evaluate and Use of Information

The students are allowed to implement self learning. They are required to use critical thinking skills, to evaluate and to use the information according to learning issues and problem or hypothesis that they already know or gain in the first phase.

Phase 3   Presentation and Synthesis

The students will return to their group and will evaluate the problem according to information and knowledge that they gain in the self-learning phase. After developing the best solutions, they will evaluate them in light of the problem statement's central issue and identified condition. Once they select the solution that fits best, they prepare to present their finding and may choose to share the problem and their solution by using concept maps, charts, graphs, proposals, position papers, models and so on. The students will construct a knowledge to relate the new knowledge to the current knowledge (if they find new learning issues after the re-evaluation of the problem in phase two and phase one, they can redo).

Engel (in Boud & Feletti, 1991) added two more phases and it becomes the main characteristic of Problem-Based Learning Model by Barrows.

Phase 4   Abstraction

After all the tasks are complete, the students will discuss about the problem, and relate it with the same or different problem to make generalisation.

Phase 5   Reflection

Students will reflect on all the problems solving process. In discussion, students will implement self evaluation and peer evaluation. This phase will help students to improve their meta cognitive skills.

Thinking Skills

The concept of thinking is a descriptive mental approach to describe how we think and it uses a combination of thinking skills in particular while attempting to solve the problem. What is stressed here is that the problem is assumed as the stimulation to start us thinking. The implementation of this process involved various steps in solving problems. The process starts by defining the problems and it is followed by searching for information, generating ideas and ending with an alternative solution. The thinking skills are divided into critical thinking, creative thinking, analytical thinking, lateral thinking and so on. However, this particular study would only test the critical thinking skills.

Critical Thinking Skills

Critical thinking is the skill for conceptualization, to apply, to analyze, to synthesis and to evaluate the information. The information can be gathered by observations, experiences, reflections and communications. The increase of the students' critical thinking skills means that there was an increase in the mean of students' post-test scores. The students' critical thinking can be improved through the use of critical thinking skill in problem solving method.

Flow Chart of PBL Process that used by students in this PBL Module

Student encounter with Problem

Student define the Problems

Brainstroming	What to solve?	What is learning objective?	What is prior knowledge and information that have to find

Student Discovery

Student find information need from various resources

Solution: Explanation to phenomena

What is the concept principles and application?	What is prediction, judgment or calculation? (if applicable/any)

Critical Thinking Skill
Inductive
Deductive
Analysis
Inference
Evaluation

Right answer and the problem is solved?

Student Reflect the answer

Evaluation	Is it the best findings or solution?	Is there any alternative findings or solution?	Compare the findings or solution with other group members or groups

Finish the solution and submit

The Stages on how the PBL is meaningful

1.   Student encounter with problems
      Student read the problems or scenarios

2.   Student define the problems
      a.   What to solve?
      b.   What is learning objectives?

Prior knowledge	Information that have to find

3.   Student discovery
      Students have to find information and knowledge from various sources and
      resources e.g. internet, text books, journals, etc individually.   Students read
      carefully and try to get as many require relevant concepts, and used it to
      explain the phenomena that was encountered.

4.   Solution – explanation to phenomena
      Critical thinking skills - students try to apply the critical thinking skill
      whenever need and appropriate:

      a.   **To create inferences** - to identify and secure elements needed to draw reasonable
            conclusions; to form conjectures and hypotheses; to consider relevant information
            and to deduce the consequences flowing from data, statements, principles,
            evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other
            forms of representation;

      b.   **To investigate assumptions** - all reasoning must begin somewhere i.e some things
            must be taken   for granted. Any "*defect*" in the assumptions or presuppositions

with which the reasoning begins is a possible source of problems in student reasoning. Assessing skills of reasoning involves assessing their ability to recognize and articulate their assumptions, again according to the relevant standards. The student's assumptions may be stated *clearly* or unclearly; the assumptions may be *justifiable* or unjustifiable, *crucial* or extraneous, *consistent* or contradictory);

c. **To make deductions (logical or reasoning)** – the two methods of reasoning are deductive (facts, certainty, syllogisms, validity, truth of premises sound arguments and conclusions) and inductive (diverse facts, probability, generalizations, hypotheses, analogies inductive strength);

d. **To make interpretations** - comprehend and express meaning or significance of wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria; and

e. **To make judgements (evaluation)** - assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representation.

5. Student reflect the answer
   Students will compare the findings or solution with other group members.

PBL Module for Student

PBL Phase	Lecturer Activity	Student Activity
Introduction Orientation	Lecture will begin the teaching: 1. Providing the problem bank sheets and choosing the problem to be discussed in class that day. 2. Explaining briefly the problem statement related with the topic content and the thinking skill to be learnt. 3. Grouping the students into groups of 4-5 people.	. 1. Listening to the lecturer's explanation and referring to the problem bank. 2. Searching for reference materials. 3. Getting into groups.
Active Thinking Brainstorming Idea re-structuring Idea application	Lecturer as a facilitator will move from group to group to give a cognitive guidance. Lecturer will check student answer/ideas. If the answer/idea is not suitable, lecturer will give a question to make sure the student can find the exact answer/idea/solution.	1. Try to solve a problem with a group. 2. Define a problem 3. Explore the task to solve a problem Solving
Thinking about thinking Reflection	Meta-cognitive activities that will assist student to think about thinking process. Lecturer will ask the direct questions to student that will encourage them to reflect: 1. Type of thinking/thinking skill that was implemented. 2. How thinking/thinking skill was implemented. 3. How far the effect of thinking skill was implemented. 4. What are the Population Economics and Policy knowledge that has been learned while brainstorming and examining the problem given.	1. Student will re-evaluate the problem that has been solved. 2. Answer to the questions will be given by lecturer. 3. Create a concept mind/notes / mind map about Population Economics and Policy knowledge that has been learned. 4. To store the learning materials as an individual task and need to be handed over to lecturer at the end of semester.

At the end of each PBL session, it is hoped that all groups will come up with solution like;

Approach Problem-Based Learning	Example of task	Process & learning Outcomes
The problem presented		
Define the problem		
Exploration		
Problem Solving		
Reflection		

Table 1:
Less Developed Regions are the sites of Future Population Growth (to the Year 2050)

		Area		
		More Development Nations	Less Developments Nations	World
	Population in 2000 (in millions)	1,194	4,877	6,071
Medium fertility variant	Projection to year 2050 (in millions)	1,220	7,699	8,919
	Increase between 2000 and 2025 (in millions)	26	2,822	2,828
	Percent of world increase attributable to each area	1	99	-
Low fertility variant	Projection to year 2050 (in millions)	1,084	6,325	7,409
	Increase between 2000 and 2025 (in millions)	-110	1,448	1,338
	Percent of world increase attributable to each area	0	100	-
High fertility variant	Projection to year 2050 (in millions)	1,370	9,263	10,633
	Increase between 2000 and 2025 (in millions)	176	4,386	4,562
	Percent of world increase attributable to each area	4	94	-

Source: Based on data in United Nations Population Division, 2003, World Population Prospects: The 2002 Revision (New York: United Nation).

Permasalah/ *Problem:*

Berdasarkan Jadual 1 di atas, anda dikehendaki menyenaraikan dua negara untuk setiap kategori. Berdasarkan pandangan dan pengetahuan anda, kenapa negara-negara yang terpilih berada dalam kategori-kategori tersebut? *Based on Table 1 above, you are required to list two countries for every category that are given. In your opinion, why are the selected countries included in the particular category?*

PBL – Case 2 (28 July 2010)

Andry merupakan seorang Pegawai Perancangan Ekonomi di Economic Planning Unit (EPU), Department of Prime Minister, Malaysia. Pada suatu hari, beliau telah dipanggil oleh oleh Ketua Unitnya. Ketua Unit berkenaan telah menunjukkan satu data statistik yang baru diperolehi daripada Jabatan Statistik Kependudukan, Department of Prime Minister. Data statistik tersebut telah memeranjatkan Pengarah Jabatan Statistik. Perkara tersebut telah dipanjangkan kepada pengetahuan Menteri Jabatan Perdana Menteri mengenai peningkatan jumlah populasi penduduk di Malaysia yang seperti tidak terkawal.

Berikut adalah butiran perbualan Andry dengan pegawai atasannya:

Andry	Tuan panggil saya?
Ketua Unit	Saya baru terima satu data statistik daripada Jabatan Statistik Kependudukan Malaysia mengenai jumlah populasi di Malaysia. Bilangan penduduk pada 1950 hanyalah seramai 9,196,373 orang. Jumlah ini meningkat kepada 13,794,560 orang pada tahun 1960 dan 18,392,746 orang pada tahun 1970.
Andry	Apa yang tuan mahu saya buat?
Ketua Unit	Sabar dulu, saya belum habis lagi! Di mana kita tadi? Ahhh...OK, populasi semakin bertambah menjadi 22,990,932 orang pada 1990. Malahan sehingga tahun ini, peningkatan populasi hampir 5 juta orang menjadi 27,589,119 orang. Saya mahu awak selidik data statistik ini dan cuba jawab segala tanda tanya yang bermain di fikiran ahli Jabatan Statistik Kependudukan Malaysia serta Department of Prime Minister, terutama sekali Minister di Department of Prime Minister.
Andry	Bila dateline untuk tugasan ini?
Ketua Unit	Kita ada masa dua bulan sahaja dari sekarang untuk Minister membentangkan perkara ini ke Jemaah Cabinet. Namun begitu, awak perlu membentangkannya di peringkat jabatan dalam masa sebulan lagi.

Sama seperti Jabatan Statistik Kependudukan Malaysia, Department of Prime Minister juga tertanya-tanya mengapa peningkatan jumlah populasi di Malaysia menunjukkan corak peningkatan sedemikan rupa. Bersesuaian dengan permasalalahan ini, Andry dikehendaki untuk membentangkan dapatan yang bakal diperolehinya di setiap rantaian komunikasi jabatan dan di hadapan Pengurusan Tertinggi Jabatan dalam bentuk yang mudah difahami.

Bagaimanakah Andry ingin membentangkan senario yang berlaku ini kepada Pengurusan Tertinggi Jabatan agar mereka tidak panik dalam menghadapi situasi yang tidak dijangka ini?

PBL – Case 3 (4 August 2010)

Transisi Kematian - Mortality Trasition

Kemerosotan kematian, bukan peningkatan kelahiran, adalah perkara asas penyebab perkembangan jumlah penduduk dunia. Ini bukan disebabkan manusia membiak seperti arnab, lebih tepat lagi, mereka tidak lagi mati seperti lalat. Hakikatnya di dalam kehidupan kita, kematian telah diberi satu pengawalan di mana kebanyakan daripada kita sekarang sudah dapat mengecapi umur yang panjang untuk lebih dihargai. Kenyataannya, usia lanjut menjadi popular, dan kita terus hidup dengan kod nombor. Kejayaan manusia mengatasi penyakit dan kematian awal sudah tentunya mewakili daripada peningkatan yang signifikan yang dibuat untuk keadaan hidup manusia, dan kita boleh bangga dengan diri kita sendiri. Lagipun, satu hasil daripada kejayaan kita adalah kejayaan kita ialah perkembangan dunia dan masalah yang timbul bersama dengan saiz populasi. Lebih–lebih lagi, masalah ini akan terus berkembang, walaupun untuk kematian yang peningkatannya dapat dikawal, masih terdapat variasi yang luas dalam jangkaan hidup dalam bahagian-bahagian berbeza di dunia begitu juga dikalangan kumpulan-kumpulan manusia yang berbeza di antara negara-negara. Perbezaan ini mewakili satu simpanan peningkatan populasi yang berpotensi, sejak kemerosotan jauh dalam kadar kematian aakan berlaku mahupun kadar tinggi peningkatan melainkan kitan mampu untuk mengurangkan kelahiran.

Permasalahan:

Pernah sekali dulu dipercayai secara meluas bahawa perbezaan di dalam kadar kematian adalah secara semulajadi genetik atau biologikal dan itu amat sukar untuk diubah, tetapi kita sudah mula tahu bahawa kebanyakan variasi adalah bergantung pada kepada sebab-sebab sosial, bukan biologikal.

1. Bantu saya dalam perbincangan berkenaan dengan perbezaan komponen sosial dan biologikal dalam kematian.
2. Kenapa manusia mati – apakah sebab spesifik kematian?
3. Bagaimana untuk mengukur kematian?
4. Siapa yang mati?

Hasil perbincangan anda perlu mempunyai dua bahagian, memaparkan (1) perubahan masa dalam risiko sosial kematian, yang kita tahu sebagai peralihan wabak, dan (2) perbezaan dalam kadar kematian di dalam masyarakat yang sama pada setiap masa diberikan (perbezaan kematian).

PBL – Case 4 (11 August 2010)

The Demographic Linkage Between the Fertility Transition and Reproductive Health

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                              ┌─────────────────┐
                              │   Increased     │
                              │   longevity     │
                              └─────────────────┘

┌─────────────────┐          ┌─────────────────┐
│ Less pressure to│  ──────▶ │ Greater freedom │
│   marry early   │          │ before marriage │
│                 │          │ and childbearing│
└─────────────────┘          └─────────────────┘
                                      │
                                      ▼              ┌─────────────────┐
                              ┌─────────────────┐    │  Urbanisation   │
                              │ Higher level of │ ◀──┤                 │
                              │   education     │    └─────────────────┘
                              └─────────────────┘
                                      │
                                      │            ┌─────────────────┐
                                      │            │     Greater     │
                                      │            │  availability of│
                                      ▼            │  paid employment│
                              ┌─────────────────┐  └─────────────────┘
         ─────────────────▶   │ Lower fertility │ ──────▶
                              └─────────────────┘
                                      │           ┌─────────────────┐
                                      │           │    Increased    │
                                      │        ◀──│  likelihood of  │
                                      │           │    financial    │
                                      ▼           │  independence   │
                              ┌─────────────────┐ └─────────────────┘
                              │ Less time spent │
                              │  bearing and    │ ◀──
                              │ rearing children│
                              └─────────────────┘
```

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┌─────────────┐
│             │
└──────┬──────┘
       │
       ▼
┌──────────────┐         ┌──────────────┐
│ Higher levels│         │ Public policy│
│ of           │         │ that         │
│ reproductive │         │ promotes     │
│ control and  │◄────────│ gender       │
│ improved     │         │ equity and   │
│ reproductive │         │ reproductive │
│ health       │         │ rights       │
└──────────────┘         └──────────────┘
```

Questions:

1. Based on the Flow Chart 1 above, you are requiring to describe detail about the movement of the flow chart.

2. At the same time, please relate in Malaysia situation (if necessary).

"Isu tunggal menjadi punca ketidakbahagiaan bagi manusia", sindir Pascal dalam kurun ke-17, *"dia sebenarnya tidak tahu untuk tinggal dengan diam di dalam biliknya".* Jika sedemikian, ketidakbahagiaan menikmati populariti yang tidak pernah berlaku sebagai manusia adalah memilih untuk meninggalkan tempat penginapan mereka. Kadangkala mereka melarikan diri daripada ketidakbahagiaan; kadangkala juga mereka yang membuat ketidakbahagiaan. Selalunya mereka bertindakbalas dan, dalam perubahan mereka, mencipta bertukar tempat tinggal. Kerana migrasi membawa bersama individu-individu yang barangkali membesar dengan pandangan dunia yang berbeza, cara menjalani kehidupan, sifat dan corak tingkah laku, ianya menyumbangkan banyak ketegangan yang dihadapi dunia, membawa kepada komen Kingsley Davis iaitu *"terlalu ragu-ragu adalah kelebihan kemasukan pendatang yang memberi satu kehairanan, mengapa industri kerajaan kebangsaan memilihnya"* (Davis 1974:105). Pendapat seperti *"Penghijrahan adalah satu keluarbiasaan tindakan kata sepakat di antara golongan dewasa...satu tindakan terdesak, ditanggung oleh pendatang dan juga tuan rumah tanpa simpati atau rasa terima kasih, satu ubat penenang, bukannya ubat merawat"* (dipetik daripada Cornelison 1980:99; Strouse 1980) dan *"pendatang yang datang ke Eropah dari negara-negara ketiga berhadapan dengan persengketaan perkauman"* (Horwitz dan Forman 1990) menggambarkan hal banjiran pendatang asing di sekeliling kita.

Jika sesebuah negara mencuba untuk menutup pintu masuk kepada pendatang, adakah itu akan menyekat orang ramai daripada berhijrah? Sudah 150 juta manusia di dalam dunia telah berhijrah-sesiapa yang tinggal dalam sesebuah negara yang lain daripada tempat di mana mereka lahir. Angka tersebut meningkat dengan kadar yang lebih cepat berbanding jumlah pertumbuhan populasi (Suruhanjaya populasi dan Pembangunan Negara-Negara Bersekutu 1997). Mengapa? Hampir 80 juta manusia bertambah setiap tahun dalam populasi dunia. Apa yang mereka ini lakukan? Disebabkan ianya telah menjadi semakin sukar kepada seorang individu untuk mencari pekerjaan yang sesuai di dalam dunia ekonomi, ini telah memaksa seseorang itu berpindah bagi mencari apa saja pekerjaan yang mampu. Seorang tua dari Mexico berkata "jangan minta Tuhan untuk memberikannya kepada kamu, minta Tuhan letakkan kamu di mana tempatnya". "Tempatnya" merujuk kepada banyak tempat dalam Mexico adalah Amerika Syarikat. Walaupun kesemua migran yang datang menuju ke Amerika Syarikat, migran dari Mexico merupakan yang terbesar bilangannya, kira-kira kepada kurang sedikit daripada 20% pendatang sah dan lebih sedikit daripada 50% pendatang haram atau tidak berdokumen.

Questions:

1. Adakah migrasi satu jenayah?
2. Penghijrah haram dalam konteks global, dan kaitkan dengana situasi Malaysia pada hari ini.

Aspek Manusia yang berbeza dari segi umur dan jantina

Kategori	Sifat atau Perlakuan
Demografi	Jatuh sakit dan aktiviti harian yang mempunyai risiko yang tinggi
	Meninggal dunia
	Kekerapan perhubungan seks yang tinggi
	Mempunyai anak
	Bergerak atau berpindah
Sosial	Telah berkahwin/cerai
	Menyertai aktiviti atau organisasi keugamaan
	Menyertai aktiviti atau organisasi politik
	Aktiviti sekolah
	Taraf pendidikan yang tinggi
	Ada masalah jenayah atau menyertai kegiatan yang dilarang
Ekonomi	Buruh kasar
	Pendapatan semasa
	Mengejar kekayaan

Umur dan jantina mempengaruhi perlaksanaan sesuatu kumpulan dalam pelbagai cara yang utama kerana kumpulan berkenaan yang menentukan peranan-peranan sosial dan kerap kali mengorganisasi manusia dan dalam pelbagai kumpulan atas prinsip utama umur dan jantina mereka (komponen sosial jantina).

Dalam aspek apakah kehidupan individu dipengaruhi oleh umur (dalam perkara lain oleh kejantinaan dan seks)?

PBL – Case 7 (1 September 2010)

Penuaan Populasi dan Penuaan Individu Menghasilkan Perubahan Dalam Masyarakat

Penuaan populasi

Meningkat dalam bilangan golongan tua, kesan daripada penurunan kadar kematian

Peningkatan dalam perimbangan golongan tua, kesan daripada penurunan dalam kadar kelahiran, digabungkan dengan migrasi dalam urbanisasi

Penuaan individu

Perubahan psikologi seiring dengan usia

Aspek sosial penuaan

- aktiviti mengikut umur
- stereotaip terhadaop golongan tua
- status golongan tua

Konteks sosial penuaan
Kejadian bersejarah yang cohort-spesifik dan corak demografi
- Sexism
- Ageism
- Racism

Struktur jantina dan usia populasi tua

Usia Tahap Ketiga
- Persaraan, pendapatan dan sumber
- Perbezaan etnik
- Susunan kehidupan dan hubungan kekeluargaan

Usia Tahap Keempat
- Penyakit
- Hilang keupayaan
- Kematian

Impak sosial penuaan populasi
- Pergantungan fizikal
- Pergantungan ekonomi
- Kawalan sumber kemasyarakatan

Usia merupakan sesuatu yang dianggap sebagai pembinaan sosial – sesuatu yang kian dibicarakan dalam masyarakat, sesuatu yang didefinisikan mengikut dasar kategori-kategori sosial tertentu dan tidak semestinya dari segi biologikal. Salah satu cara yang baik untuk menggambarkan konsep ini adalah untuk merenungkan persoalan yang dikemukakan oleh Satchel Paige iaitu;

How old would you be, if you didn't know how old you were? (Berapa umur anda sekarang, jika anda tidak tahu umur anda dahulu?).

Berdasarkan diagram di atas, bagaimanakah penuaan populasi dana penuaan individu member impak kepada pembangunan sesebuah komuniti dan negara.

| Appendix G | Monitoring Notes for Intervention (PBL & TL) |

Pemerhatian ke:
Tajuk :
Tarikh:

KAEDAH/AKTIVITI P&P MATA PELAJARAN PEA3063					
1. SESI PERMULAAN PENGAJARAN					
i. Pensyarah melakukan perancangan dalam aktiviti P&P untuk menerapkan 'problem solving skills dan critical thinking skills' pengajaran dijalankan.					
ii. Kaedah dan aktiviti pengajaran yang selalu Pensyarah jalankan semasa permulaan pengajaran (set induksi). § Soal jawab § Sumbang saran § Syarahan § Main Peranan § Gerak kerja berkumpulan § Simulasi § Perbincangan § Latihan pengukuhan § Bercerita § Penyelesaian Masalah § Penerangan § Penilaian § Rumusan § Lain-lain					
iii. Pensyarah cuba menerapkan 'problem solving skills dan critical thinking skills' secara tidak langsung semasa sesi permulaan pengajaran PEA3063.					
iv. Pensyarah cuba menerapkan 'problem solving skills dan critical thinking skills' secara langsung dalam pengajaran semasa permulaan pengajaran.					
v. Pensyarah tidak memperlihatkan 'problem solving skills dan critical thinking skills' mereka semasa sesi permulaan pengajaran.					
vi. Pensyarah menjelaskan nilai murni yang dirasakan penting dalam topik yang diajar semasa permulaan pengajaran PEA3063.					
vii. Pensyarah menekankan perbezaan antara 'problem solving skills dan critical thinking skills' yang dikemukakan tanpa memperlihatkan 'problem solving skills dan critical thinking skills' yang beliau rasakan penting dalam pengajaran semasa permulaan pengajaran.					
viii. Pensyarah menjelaskan perbezaan antara 'problem solving skills dan critical thinking skills' 'problem solving skills dan critical thinking skills' dan memperlihatkan 'problem solving skills dan critical thinking skills' yang dirasakan penting.					
ix. Alat Bantuan Mengajar Digunakan Pensyarah PEA3063 a. Power Point/Komputer b. Kertas Mahjung c. Slide					

d. Kadbod					
e. Buku Teks					
f. Televisyen					
g. Radio					
h. Carta					
i. Papan putih dan marker					
j. Bahan dari surat khabar, majalah dll.					
2. SESI PERKEMBANGAN PENGAJARAN					
x. Kaedah dan aktiviti pengajaran yang selalu Pensyarah jalankan semasa perkembangan pengajaran (set induksi). § Soal jawab § Sumbang saran § Syarahan § Main Peranan § Gerak kerja berkumpulan § Simulasi § Perbincangan § Latihan pengukuhan § Bercerita § Penyelesaian Masalah § Penerangan § Penilaian § Rumusan § Lain-lain					
xi. Pensyarah cuba menerapkan 'problem solving skills dan critical thinking skills' secara tidak langsung dalam pengajaran semasa sesi perkembangan pengajaran.					
xii. Pensyarah cuba menerapkan 'problem solving skills dan critical thinking skills' secara langsung dalam pengajaran semasa sesi perkembangan.					
xiii. Pensyarah tidak memperlihatkan 'problem solving skills dan critical thinking skills' mereka semasa perkembangan pengajaran PEA3063.					
xiv. Pensyarah menjelaskan 'problem solving skills dan critical thinking skills' yang dirasakan penting dalam topik yang diajar semasa sesi perkembangan pengajaran PEA3063.					
xv. Guru menekankan perbezaan antara 'problem solving skills dan critical thinking skills' yang dikemukakan tanpa memperlihatkan 'problem solving skills dan critical thinking skills' yang beliau rasakan penting dalam perkembangan pengajaran.					
xvi. Pensyarah menjelaskan perbezaan antara nilai-nilai dan memperlihatkan 'problem solving skills dan critical thinking skills' yang dirasakan penting.					
xvii. Alat Bantuan Mengajar Digunakan Pensyarah PEA3063 a. Power Point/Komputer b. Kertas Mahjung c. Slide d. Kadbod e. Buku Teks f. Televisyen					

g. Radio					
h. Carta					
i. Papan putih dan marker					
j. Bahan dari surat khabar, majalah dll.					
3. SESI PENUTUP PENGAJARAN					
xviii. Kaedah dan aktiviti pengajaran yang selalu Pensyarah jalankan semasa penutup pengajaran (set induksi). § Soal jawab § Sumbang saran § Syarahan § Main Peranan § Gerak kerja berkumpulan § Simulasi § Perbincangan § Latihan pengukuhan § Bercerita § Penyelesaian Masalah § Penerangan § Penilaian § Rumusan § Lain-lain					
xix. Pensyarah cuba menerapkan 'problem solving skills dan critical thinking skills' secara tidak langsung dalam pengajaran semasa sesi penutup.					
xx. Pensyarah cuba menerapkan 'problem solving skills dan critical thinking skills' secara langsung dalam pengajaran semasa sesi penutup.					
xxi. Pensyarah tidak memperlihatkan 'problem solving skills dan critical thinking skills' mereka semasa penutup pengajaran..					
xxii. Pensyarah menjelaskan 'problem solving skills dan critical thinking skills' yang dirasakan penting dalam topik yang diajar semasa penutup pengajaran PEA3063.					
xxiii. Guru menekankan perbezaan antara 'problem solving skills dan critical thinking skills' yang dikemukakan tanpa memperlihatkan nilai yang beliau rasakan penting dalam penutup pengajaran.					
xxiv. Pensyarah menjelaskan perbezaan antara 'problem solving skills dan critical thinking skills' dan memperlihatkan 'problem solving skills dan critical thinking skills' yang dirasakan penting.					
xxv. Alat Bantuan Mengajar Digunakan Pensyarah PEA3063 a. Power Point/Komputer b. Kertas Mahjung c. Slide d. Kadbod e. Buku Teks f. Televisyen g. Radio h. Carta i. Papan putih dan marker j. Bahan dari surat khabar, majalah dll.					

| Appendix H | A Lecturer's PBL Module Booklet |

A Lecturer's Problem-Based Learning
(PBL) Module Booklet

What is Problem-Based Learning?

Problem-Based Learning is not a new phenomenon. According to Boud and Feletti (1991), Problem-Based Learning is a methodology that will be used before the formal classroom concepts are introduced. Problem-Based Learning curriculum as a core in this research was introduced by Howard Barrows (medical education programmes, McMaster University, Canada) in the early 1969. The origin of Problem-Based Learning can be traced to the progressive movement, especially to John Dewey's (1944) belief that teachers should teach by appealing to the students' natural instincts to investigate and create. This learning approach has spread to medical schools in North America, Europe, and Australia in the early 1980's and has been adopted by schools of engineering, architecture, social work, law, nursing, and among others (Boud & Feletti,1997).

According to the McMaster model (Barrows & Tamblyn, 1980), the concept of the Problem-Based Learning method involves three phases which are:

a)   revealing the problem scenarios,

b)   finding information, and

c)   discussion and new knowledge application to the problems.

The Problem-Based Learning method stresses that problem solving activities are a style to gain and to apply the knowledge (Barrows & Tamblyn, 1980). It is becoming an increasingly popular term in tertiary education and was first applied in business schools (Kwan, 2000), as more and more educational disciplines implement the teaching and learning approach associated with the terminology, previously believed to be monopolised by medical schools. This learning approach applies widely to learning in most professional schools and disciplines. In fact, some argue that it is the most significant innovation since the move of professional training into educational institutions (Boud & Felletti, 1997).

In the Problem-Based Learning curriculum there are five phases which must be implemented by the students:

Phase 1 :   Define and Analyze the Problem

Students will form into small groups (contain 5-8 students) and it will be led by facilitator or tutor. After that, all the groups will get a problem scenario (without learning process at early stage). Students must analyze, synthesize, and evaluate to gain a sense of the whole and formulate a viable solution (Torp & Sage, 2002, p. 20). In this process, students will find a real problem, learning issues or learning objectives regarding to three main problem:

d)   What do you know about this problem?

e)   What did you require to solve this problem efficiently? And

f)   What are the sources did you require to solve this problem or this generated hypothesis? After that, the students must make an action plan to solve this problem.

Phase 2   Find, Evaluate and Use of Information

The students are allowed to implement self learning. They are required to use critical thinking skills, to evaluate and to use the information according to learning issues and problem or hypothesis that they already know or gain in the first phase.

Phase 3   Presentation and Synthesis

The students will return to their group and will evaluate the problem according to information and knowledge that they gain in the self-learning phase. After developing the best solutions, they will evaluate them in light of the problem statement's central issue and identified condition. Once they select the solution that fits best, they prepare to present their finding and may choose to share the problem and their solution by using concept maps, charts, graphs, proposals, position papers, models and so on. The students will construct a knowledge to relate the new knowledge to the current knowledge (if they find new learning issues after the re-evaluation of the problem in phase two and phase one, they can redo).

Engel (in Boud & Feletti, 1991) added two more phases and it becomes the main characteristic of Problem-Based Learning Model by Barrows.

Phase 4   Abstraction

After all the tasks are complete, the students will discuss about the problem, and relate it with the same or different problem to make generalisation.

Phase 5   Reflection

Students will reflect on all the problems solving process. In discussion, students will implement self evaluation and peer evaluation. This phase will help students to improve their meta cognitive skills.

The following are of special importance for Business Education:

a)   Problem-Based Learning puts the educational focus on practice relevant knowledge, drawing attention from material that is purely of academic interest.

b)   Problem-Based Learning assignments can draw on knowledge from multiple disciplines, increasing students' abilities to integrate knowledge across business functional areas.

c)   By working in problem solving teams, students using this approach are able to develop teamwork, leadership, and interpersonal skills.

d)   This learning approach also increases student motivation, a "supercharging" effect that boosts these and other benefits.

What is Critical Thinking Skill?

Watson and Glaser (1980) define the concept of critical thinking as the unity of attitude, knowledge and ability which comprise:

a)   curiosity and ability to identify the existence of problems and accepting the evidence which support what is considered as true,

b)   knowledge of conditions to construct a valid conclusion,

c)   generating ideas and generalisations which are supported by logical evidence and

d)   the ability to apply the attitude and knowledge above.

Critical thinking consists of three abilities:

a)   ability to collect data and to use the correct senses to choose related information,

b)   ability to analyze the data and to process the data, to classify, to make inferences, to make forecasts, to validate and to design hypothesis, and

c)   ability to take action on information and to solve a problem.

In order to promote students ability to think critically, one must employ primarily these components. The researcher took into account the core critical thinking skills presented by Facione (2006) which are:

a)   To create inferences - to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation;

b)   To investigate assumptions - all reasoning must begin somewhere i.e some things must be taken   for granted. Any "defect" in the assumptions or presuppositions with which

the reasoning begins is a possible source of problems in student reasoning. Assessing skills of reasoning involves assessing their ability to recognize and articulate their assumptions, again according to the relevant standards. The student's assumptions may be stated clearly or unclearly; the assumptions may be justifiable or unjustifiable, crucial or extraneous, consistent or contradictory);

c)   To make deductions (logical or reasoning) – the two methods of reasoning are deductive (facts, certainty, syllogisms, validity, truth of premises sound arguments and conclusions) and inductive (diverse facts, probability, generalizations, hypotheses, analogies inductive strength);

d)   To make interpretations - comprehend and express meaning or significance of wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria; and

e)   To make judgements (evaluation) - assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representation.

Thinking Tools

Thinking tools are instruments which enable us to use our minds in a more structured and effective way. By using these thinking tools, the ideas presented will be more organized and illustrate our thoughts effectively. These modules use the following thinking tools:

a)   Questions and Questioning
b)   Cognitive Management – Problem-solving process and mind mapping

Questions and Questioning
The question is the tool used by someone to stimulate, especially to obtain information and to explore one's understanding. The questioning is a technique or the way the person submit the questions to fulfil the needs and purpose.

Questions and Questioning Purposes:

a)   Expanding the creative and critical thinking skills,

b)   Collect and analyze information,

c)   Encourage and enhance students' metacognitive process,

d)   Review what is being learned,

e)   Stimulate students' to actively participate in learning process,

f)   Encourage new ideas arcing and use of existing ideas,

g)   Creating an atmosphere for sharing ideas with, and

h)   To attract students attention to remain in learning.

According to Bloom (1956), knowledge can be divided into six levels of cognitive, namely knowledge, comprehension, application, analysis, evaluation and synthesis. As such, it can be quite similar to questioning. To encourage you to use the highest level of thinking, it is better for you to progressively master your mind in the use of questions in the application, analysis, and evaluation synthesis. The Bloom's Taxonomy Questions Stems below could be used as a guideline during the construction of questions to be presented to students for their discussions in PBL approach.

Bloom's Taxonomy Question Stems
(Adopted from Dalton, J. & Smith, D. (1986) "Extending Children's Special Abilities – Strategies for primary classrooms", pp. 36-7)

Knowledge

Useful Verbs	Sample Question Stems	Potential activities and products
Tell	What happened after...?	Make a list of the main events..
List	How many...?	Make a timeline of events.
Describe	Who was it that...?	Make a facts chart.
Relate	Can you name the...?	Write a list of any pieces of
Locate	Describe what happened at...?	information you can remember.
Write	Who spoke to...?	List all the....in the story.
Find	Can you tell why...?	Make a chart showing...
State	Find the meaning of...?	Make an acrostic.
Name	What is...?	Recite a poem.
	Which is true or false...?	

Comprehension

Useful Verbs	Sample Question Stems	Potential activities and products
Explain Interpret Outline Discuss Distinguish Predict Restate Translate Compare Describe	Can you write in your own words...? Can you write a brief outline...? What do you think could of happened next...? Who do you think...? What was the main idea...? Who was the key character...? Can you distinguish between...? What differences exist between...? Can you provide an example of what you mean...? Can you provide a definition for...?	Cut out or draw pictures to show a particular event. Illustrate what you think the main idea was. Make a cartoon strip showing the sequence of events. Write and perform a play based on the story. Retell the story in your words. Paint a picture of some aspect you like. Write a summary report of an event. Prepare a flow chart to illustrate the sequence of events. Make a colouring book.

Application

Useful Verbs	Sample Question Stems	Potential activities and products
Solve Show Use Illustrate Construct Complete Examine Classify	Do you know another instance where...? Could this have happened in...? Can you group by characteristics such as...? What factors would you change if...? Can you apply the method used to some experience of your own...? What questions would you ask of...? From the information given, can you develop a set of instructions about...? Would this information be useful if you had a ...?	Construct a model to demonstrate how it will work. Make a diorama to illustrate an important event. Make a scrapbook about the areas of study. Make a paper-mache map to include relevant information about an event. Take a collection of photographs to demonstrate a particular point. Make up a puzzle game suing the ideas from the study area. Make a clay model of an item in the material. Design a market strategy for your product using a known strategy as a model. Dress a doll in national costume. Paint a mural using the same materials. Write a textbook about... for others.

Analysis

Useful Verbs	Sample Question Stems	Potential activities and products
Analyse Distinguish Examine Compare Contrast Investigate Categorise Identify Explain Separate Advertise	Which events could have happened...? I ... happened, what might the ending have been? How was this similar to...? What was the underlying theme of...? What do you see as other possible outcomes? Why did ... changes occur? Can you compare your...with that presented in...? Can you explain what must have happened when...? How is ... similar to...? What are some of the problems of...? Can you distinguish between...? What were some of the motives behind...? What was the turning point in the game? What was the problem with...?	Design a questionnaire to gather information. Write a commercial to sell a new product. Conduct an investigation to produce information to support a view. Make a flow chart to show the critical stages. Construct a graph to illustrate selected information. Make a jigsaw puzzle. Make a family tree showing relationships. Put on a play about the study area. Write a biography of the study person. Prepare a report about the area of study. Arrange a party. Make all the arrangements and record the steps needed. Review a work of art in terms of form, colour and texture.

Synthesis

Useful Verbs	Sample Question Stems	Potential activities and products
Create Invent Compose Predict Plan Construct Design Imagine Propose Devise Formulate	Can you design a ... to...? Why not compose a song about...? Can you see a possible solution to...? If you had access to all resources how would you deal with...? Why don't you devise your own way to deal with...? What would happen if...? How many ways can you...? Can you create new and unusual uses for...? Can you write a new recipe for a tasty dish? can you develop a proposal which would...	Invent a machine to do a specific task. Design a building to house your study. Create a new product. Give it a name and plan a marketing campaign. Write about your feelings in relation to... Write a TV show, play, puppet show, role play, song or pantomime about...? Design a record, book, or magazine cover for...? Make up a new language code and write material suing it. Sell an idea. Devise a way to... Compose a rhythm or put new words to a known melody.

Evaluation

Useful Verbs	Sample Question Stems	Potential activities and products
Judge	Is there a better solution to...	Prepare a list of criteria to judge a ...
Select	Judge the value of...	show. Indicate priority and ratings.
Choose	Can you defend your position	Conduct a debate about an issue of
Decide	about...?	special interest.
Justify	Do you think ... is a good or a	Make a booklet about 5 rules you
Debate	bad thing?	see as important. Convince others.
Verify	How would you have	Form a panel to discuss views, eg
Argue	handled...?	"Learning at School."
Recommend	What changes to ... would you	Write a letter to ... advising on
Assess	recommend?	changes needed at...
Discuss	Do you believe?	Write a half yearly report.
Rate	Are you a ... person?	Prepare a case to present your view
Prioritise	How would you feel if...?	about...
Determine	How effective are...?	
	What do you think about...?	

Teaching Method Using PBL in one Lesson

PBL Phase	Lecturer Activity	Student Activity
Introduction Orientation	Lecture will begin the teaching: 4. Providing the problem bank sheets and choosing the problem to be discussed in class that day. 5. Explaining briefly the problem statement related with the topic content and the thinking skill to be learnt. 6. Grouping the students into groups of 4-5 people.	. 4. Listening to the lecturer's explanation and referring to the problem bank. 5. Searching for reference materials. 6. Getting into groups.
Active Thinking Brainstorming Idea re-structuring Idea application	Lecturer as a facilitator will move from group to group to give a cognitive guidance. Lecturer will check student answer/ideas. If the answer/idea is not suitable, lecturer will give a question to make sure the student can find the exact answer/idea/solution.	4. Try to solve a problem with a group. 5. Define a problem 6. Explore the task to solve a problem Solving
Thinking about thinking Reflection	Meta-cognitive activities that will assist student to think about thinking process. Lecturer will ask the direct questions to student that will encourage them to reflect: 5. Type of thinking/thinking skill that was implemented. 6. How thinking/thinking skill was implemented. 7. How far the effect of thinking skill was implemented. 8. What are the Population Economics and Policy knowledge that has been learned while brainstorming and examining the problem given.	5. Student will re-evaluate the problem that has been solved. 6. Answer to the questions will be given by lecturer. 7. Create a concept mind/notes / mind map about Population Economics and Policy knowledge that has been learned. 8. To store the learning materials as an individual task and need to be handed over to lecturer at the end of semester.

At the end of each PBL session, it is hoped that all groups will come up with solution like;

Approach Problem-Based Learning	Example of task	Process & learning Outcomes
The problem presented		
Define the problem		
Exploration		
Problem Solving		
Reflection		

Appendix I	University of Strathclyde Ethics Committee

Notice of Departmental Ethics Committee Decision

Date: 8[th] June 2010

Applicant: Dr Eleni Karagiannidou (MOHD NAZIR MD ZABIT)

Project Title: The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia

Notification that revisions are required

The Departmental Ethics Committee was unable to approve your application for ethics approval for the above investigation. The committee withhold approval pending revision to your application vis:

Although the application acknowledges the necessity of participant information sheets and consent forms, these are not attached and no process is outlined for their use. These are particularly crucial given that the participants' responses are not anonymous and it appears that the researcher is their lecturer. Consent is withheld pending receipt of the required information   sheet   and   consent   forms.

When revisions are made we will welcome your reapplication. Your reapplication should be submitted to:

Tammy Mclean
Department Administrator
Room W314A
Sir Henry Wood Building

For the Departmental Ethics Committee

David Wallace (Chair)

Purpose

This form applies to all investigations (other than generic applications) on human subjects undertaken by staff or students of the University that fall within the scope of the University's Code of Practice on Investigations involving Human Beings. Such investigations may fall within the remit of the University Ethics Committee (see Code of Practice Section B1) or the Departmental Ethics Committees (see Code of Practice Section B2). However, this form should NOT be used for generic applications (there is a separate form for this) or any investigation involving clinical trials or the National Health Service (including staff, patients, facilities, data, tissue, blood or organ samples from the NHS). Applications for investigations involving the NHS must be made under the governance arrangements for National Health Service Research Ethics Committees (see Code of Practice Section B9) and where ethical approval is required from the NHS the form to be used is that issued by IRAS.

Language

The form should be completed in language that is understandable by a lay person. Please explain any abbreviations or acronyms used in the application. Guidance on completing this application form is attached in order to assist applicants and further information is available in the Code of Practice.

Attachments

Information sheets for volunteers and consent forms to be used in the investigation must be submitted with the application form for consideration by the Committee. Templates for the information sheets and consent forms can be found on the Ethics web page. The application will be judged entirely on the information provided in this form and any accompanying documentation – full grant proposals to funding bodies should NOT be attached. Applications which are not signed and/or do not include the required additional information (e.g. information sheet

and consent form) will not be considered by the Ethics Committee and will be referred back to the Chief Investigator.

Completion   The form is designed for completion in Word, and should in any case be typed rather than handwritten. The grey-shaded text boxes on the form will expand to allow you to enter as much information as you require. Please do not alter any of the text outside the shades areas. If you have any difficulty filling out the form in Word, please contact ethics@strath.ac.uk.

Please click on the 🔑 for guidance on how to complete each section of the form.

PLEASE COMPLETE THE FORM IN BOLD TYPE FACE

Checklist of enclosed Documents

Document	Enclosed	N/A
Participant information sheet(s)	☐	🔑
Consent form(s)	☐	🔑
Sample questionnaire(s)	🔑	☐
Sample interview format(s)	☐	🔑
Sample advertisement(s)	☐	🔑
Any other documents (please specify below)		
Lesson Plan - PBL	🔑	☐
PBL Case Studies	🔑	☐
	☐	☐

1. Chief Investigator (Ordinance 16 member of staff only) 🔑

Name:

Status: Professor ☐
                           Reader ☐
                  Senior Lecturer ☐
                         Lecturer ☐

Department:

Contact Details: Telephone:

                    E-mail:

2. Other Strathclyde Investigator(s) 🔑

Name(s): MOHD NAZIR MD ZABIT

Status (e.g. lecturer, post-/undergraduate): POSTGRADUATE

Department(s): EPS

If student(s), name of supervisor: DR. ELENI KARAGIANNIDOU

Contact Details: Telephone: 07780934355 / 01414236042

                    E-mail: nazirzabit300@yahoo.co.uk / mohd-md-zabit@strath.ac.uk

Details for all investigators involved in the study:

3. Non-Strathclyde collaborating investigator(s)	Name(s): Status: Department/Institution: If student(s), name of supervisor: Contact Details: Telephone: E-mail: Please provide details for all investigators involved in the study:
4. Overseas Supervisor(s)	Name(s): Status: Department/Institution: Contact Details: Telephone: E-mail: I can confirm that the local supervisor has obtained a copy of the Code of Practice: Yes ☐ No ☐ Please provide details for all supervisors involved in the study
5. Title of the Investigation:	**The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia**
6. Where will the investigation be conducted:	**Faculty of Business and Economics (FPE)** **University Pendidikan Sultan Idris (UPSI)** **Malaysia**

7. Duration of the Investigation (years/months):	(Expected) start date: 01/07/2010 (Expected) completion date: 30/09/2010

8. Sponsor (please refer to Section C and Annex 3 of the Code of Practice):	MINISTRY OF HIGHER EDUCATION, MALAYSIA & UNIVERSITY PENDIDIKAN SULTAN IDRIS (UPSI), MALAYSIA

9. Funding Body (if applicable)	Status of proposal – if seeking funding (please click appropriate box): In preparation ☐ Submitted ☐ Accepted Date of Submission of proposal: / / Date of start of funding: / /

10. Objectives of investigation (including the academic rationale and justification for the investigation)	This research aims to focus on the implementation of PBL method among lecturers to improve students' critical thinking skills using PBL methodology in PEA3063 at the lecture rooms at the Faculty of Business and Economics, Sultan Idris University of Education (UPSI), Malaysia. As the PBL method is new in Malaysia educational system, I will try to explore the effectiveness of PBL by practice and implementation on students' critical thinking skills through PEA3063 in lecture rooms. Next, this study will try to identify the students' perception and interest on the implementation of critical thinking skills through PBL method. Other objectives include exploring the relationship between students' critical thinking skill and students' academic achievement of PEA3063 through PBL.

11.
Nature of the participants:

Are any of the categories mentioned in Section B1(b) (participant considerations) applicable in this investigation?	Yes ☐ No

If 'yes' please detail:

            Number: Age (range):

Please also include information on: recruitment methods (see section B4 of the Code of Practice); inclusion/exclusion criteria; and any further screening procedure to be use

Investigations governed by the Code of Practice that involve any of the types of projects listed in B1(b) must be submitted to the University Ethics Committee for prior approval.

12.
What consents will be sought and how?

The information sheets and consent forms to be used should be attached to this form.

-attach-

13. Methodology:	Are any of the categories mentioned in the Code of Practice Section B1(a) (project considerations) applicable in this investigation?	Yes ☐	No

If 'yes' please detail:

Design: what kind of design/research method(s) is/are to be used in the investigation?

I will use a quasi-experimental as a research method

Techniques: what specific techniques will be employed and what exactly is required of participants?

The research population will comprise a convenience sample of 50 students of the Faculty of Business and Economics, UPSI, Malaysia who are undergoing the Bachelor Degree of Education (Economics). The sample comprises a group of final semester students who are registering for the PEA3063 in Semester 1 Session 2010/2011 (July 2010). Students in each group will be divided into at least two different lecture groups and each group will be conducted by the same lecturer (to be decided later). The students will be equally and randomly assigned to either a treatment group ($n = 25$) or a control group ($n = 25$).

Investigations governed by the Code of Practice that involve any of the types of projects listed in B1(a) must be submitted to the University Ethics Committee for prior approval.

Has this methodology been subject to independent scrutiny?	Yes ☐	No

Please provide the name and contact details of the independent reviewer

Where an independent reviewer is not used, then the UEC/ DEC reserves the right to scrutinise the methodology.

14.
Data collection, storage and security:

Will anyone other than the named investigators have access to the data?
If 'yes' please explain.

15.
Potential risks or hazards:

-not applicable-

16.
Ethical issues:

Initially the general principles of this study will be discussed with the Dean of the Faculty of Business and Economics and the Head of Department of programme who will then approve and support the project of developing the proposal. Full permission from the UPSI management will be required before access to the subjects of this research, the final year Bachelor of Education (Economics) students.

The request for ethical consent will include an explanation of the study, its rational and method.   Other items to be included are the copies of the tools to be used and a synopsis of the proposed study. After the study has been completed, the ethical committee will be informed about the results.

To assure the protection of human rights, information about the study will be given to every participant. The students will be given the opportunity to determine their willingness to participate. A signed, informed consent form will be obtained from each student before treatment and data collection. It is entirely up to the students if they refuse to participate or withdraw from the study at any time without any punishment.

In order to ensure confidentially, code numbers will be used. The list

of code numbers and associated names will be kept separately from the actual data. The data obtained from the participants will be used only for this study. All findings will be reported as group results and will be submitted for publication.

17. Any payment to be made:

18. What debriefing, if any, will be given to participants?

-not applicable-

19. How will the outcomes of the study be disseminated? Will you seek to publish the results?

I plan to publish the findings in a an academic journals, conference proceedings, etc.

20. Nominated person (and contact details) to whom participants' concerns/ questions should be directed before, during or after the investigation.	Prof. Dr. Omar Abdul Kareem Dean Faculty of Business and Economics Sultan Idris University of Education (UPSI) 35900 Tanjong Malim Perak Malaysia +6054506000 dean@fpe.upsi.edu.my / omark@fpe.upsi.edu.my
21. Previous experience of the investigator(s) with the procedures involved.	-not applicable-

22. Chief Investigator and Head of Department Declaration

I have read the University's Code of Practice on Investigations involving Human Beings and have completed this application accordingly.

Signature of Chief Investigator

Please also type name here   DR. ELENI KARAGIANNIDOU

I confirm I have read and approved this application.

Signature of Head of Department

Please also type name here

Date: / /

23.

Only for University sponsored projects under the remit of the DEC, with no external funding and no NHS involvement.

Head of Department statement on Sponsorship

This application requires the University to sponsor the investigation. This is done by the Head of Department for all DEC applications with exception of those that are externally funded and those which are connected to the NHS (those exceptions should be submitted to R&I). I am aware of the implications of University sponsorship of the investigation and have assessed this investigation with respect to sponsorship and management risk. As this particular investigation is within the remit of the DEC and has no external funding and no NHS involvement, I agree on behalf of the University that the University is the appropriate sponsor of the investigation and there are no management risks posed by the investigation.

If not applicable, click here ☐

Signature of Head of Department

Please also type name here

Date: / /

For applications to the University Ethics Committee the completed form should be sent to ethics@strath.ac.uk with the relevant electronic signatures.

The form should normally be used for applications to the University Ethics Committee or Departmental Ethics Committees. Departmental Ethics Committees may add some supplementary questions if they choose to do so, and should provide additional guidance that is specific to the types of investigation typically taking place there. This might be in the form of additional text giving examples of aspects that typically arise in Departmental research, or of important but subtle points that might be missed by less experienced investigators.

General Guidance

Applicants must ensure that they have read the University's Code of Practice on Investigations involving Human Beings before completing the form.

The form is used for all investigations involving human participants. Applications for ethical approval for investigations involving the National Health Service in any way must be made under the governance arrangements for National Health Service Research Ethics Committees and where ethical approval is required from the NHS using the form issued by IRAS. Generic framework applications should be submitted on the appropriate University generic framework application form.

The application will be judged entirely on the information provided in this form and any accompanying documentation - full grant proposals to funding bodies should not be attached. The application should, as much as possible, be written in plain English and should explain any abbreviations, acronyms etc used. The Code of Practice contains guidance on information sheets and on consent forms. It is important to ensure that the different types of documentation you provide are consistent – for example that the procedure explained to participants is the same as that described on the form – as otherwise your application may be delayed.

Applications which are not signed and/or do not include the required additional forms (e.g. participant information sheet and consent form) will not be considered by the University Ethics Committee and will be referred back to the Chief Investigator.

The form is designed for completion in Word, and should in any case be typed rather than handwritten. The text boxes on the form will expand to allow you to enter as much information as you require.   Please do not delete any sections, even if they are not relevant. If you have difficulty filling out the form in Word, please contact the Secretary to the Ethics Committee in the Secretariat (ext. 2752) or email ethics@strath.ac.uk.

Specific Guidance Per Question:

1. t Return	The Chief Investigator is the (Ordinance 16) member of staff at Strathclyde with overall responsibility of the work being carried out at, or under the auspices of, the University of Strathclyde. In the

case of student projects, the Chief Investigator should be the student's supervisor. In the case of projects with external collaborators, the lead Strathclyde investigator, who is an Ordinance 16 member of staff, should be the Chief Investigator.

2.

Details of all other investigators at Strathclyde should be added here, with the format repeated in the final text box as many times as necessary. Please note that all email addresses should be to a University or other secure site. Personal telephone numbers (as opposed to work numbers), other than mobile phone numbers, should not be given.

3.

The same information as under (2) is given for non-Strathclyde investigators.

4.

If the investigation is taking place overseas, then the Researcher needs to provide the name of a local supervisor and confirm that the supervisor has received a copy of the University's Code of Practice. Please refer to section B11 of the Code of Practice.

6.

The location, or locations, of the investigation should be given. These should be places suitable for the type of investigation to be undertaken and where both participants and investigators are safely able to carry out the work. If this is not apparent then there should be some mention of this under the section on Potential risks or hazards. Note that the Committee reserves the right to visit testing sites and facilities.

7.

Investigations should not begin until ethical approval is confirmed.

8.

The sponsor would normally be the University of Strathclyde, the NHS, or an external body with management responsibility. If the investigation is within the remit of the DEC, has no external funding and has no NHS involvement, then the Head of Department can decide whether the University can sponsor the study and can sign the form at the relevant section. If the investigation comes within the remit of the UEC or has external funding or has NHS involvement then sponsorship must be decided through the Research & Innovation procedure. In this regard, the Management Risk Assessment and Sponsorship form must be completed and submitted to Research & Innovation. Further information can be provided by Research & Innovation www.strath.ac.uk/ri/grantscontracts/ethicssponsorship/.

9. t Return	If a body outside the University of Strathclyde is to fund the investigation, it should be stated here. In such instances the project will need to go through the Research and Innovation Risk Management and Sponsorship approval procedure – as mentioned at 8 above.
10. t Return	Give a brief outline of the background, purpose and the possible benefits of the investigation. This should include a statement on the academic rationale and justification for conducting the investigation. Please use plain English and explain any acronyms or specialist terms used.
11. t Return	In this section you should indicate what kinds of participants you will use. You should specifically mention the following points: Recruitment method(s), e.g. by letter, email, advertisement – see Section B4 of the Code of Practice for further information. Inclusion/exclusion criteria, that is, the grounds on which you will select participants from volunteers. This could include gender, special skills, attributes, medical conditions. Screening procedure, that is, the procedure by which the inclusion/exclusion criteria are applied, and in addition the way(s) in which certain participants are selected for a second or later stage of an investigation (for example where a questionnaire to a wide group is followed up by interviews to a small group). If any of the categories mentioned in the Code of Practice Section B1(b) (participant considerations) are applicable to your investigation then these should be detailed here.
12. t Return	In this part of the form you should confirm how consent is to be obtained, and whether there are any special problems in obtaining informed consent. The section of the Code of Practice on Consent (Section B4) discusses how to deal with special cases such as children and those with legal guardians. If no consent is obtained from appropriate persons, or consent to limited information on the purpose and methodology of the study is obtained, then the research involves an element of deception.
13. t Return	If any of the categories mentioned in the Code of Practice Section B1 are applicable to your investigation then you should answer 'yes' here. The application will then be considered by the UEC rather than the DEC. Under the design question you should give a brief outline of the overall design/methodology being employed, for example interview, experimental, observation, randomised control trial, etc. This should broadly indicate why the methodology is appropriate to the research objectives, including a justification of the chosen sample size. In the question on

techniques you should give a more detailed description of the precise techniques involved and of the ways in which the participants are involved. If you indicated that one or more of the categories mentioned in the Code of Practice Section B1 is applicable to your investigation then you must explain the ways in which they arise in the study. Where an invasive procedure is involved, the application should state who will be performing the procedure; if that person is medically qualified, this fact should also be stated. The duration of the study for participants and frequency of testing (if repeat testing is necessary) should be described. Finally, the methodology of all research proposals should be independently reviewed. The researcher should provide the contact details of the independent reviewer. If the methodology has not been subject to independent review, then the UEC/ DEC reserves the right to scrutinise the methodology.

14. t Return	You should say how data are handled, specifying whether it will be fully anonymised, pseudo-anonymised, or just confidential, and whether it will be securely destroyed after use. You should also state how and where it will be stored, who has access to it, and how long it will be stored. It is a normal expectation that data will be stored securely on University premises. For further guidance, see section D1(b) and Annex 9 of the Code of Practice. University guidelines on the Data Protection Act can be found at www.strath.ac.uk/dataprotection/.
15. t Return	Full details should be given of any potential risks or discomfort for participants, any burdens imposed and any preparatory requirements (e.g. special diet, exercise), as well as any steps/procedures taken to minimize these risks and/or discomforts. Details should also be given of any potential risks to investigators (e.g. location of interview).
16. t Return	You should describe what you consider to be the main ethical issues which may arise during the investigation, and how you propose to address them. If you answered 'yes' in Questions 11 or 13 then you should particularly address the issues mentioned there.
17. t Return	You should report reimbursements for time or expenses incurred, plus any additional fee/incentive for participation.
18.	A debriefing of participants may be appropriate in some

	investigations, for example to enable participants to express how they felt during an investigation, to offer counselling, or to communicate views on the whole process that they were not able to do previously, possibly to explain a study which involved deception.
20.	A member of University staff should always be named here. In the case of student projects, both the supervisor and the student should be named.
21.	The Chief Investigator and Head of Department must sign this part of the form.
22.	If the investigation is within the remit of the DEC, has no external funding and has no NHS involvement, then the Head of Department can decide whether the University can sponsor the study and can sign the form accordingly. If the investigation comes within the remit of the UEC or has external funding or has NHS involvement then sponsorship must be decided through the Research & Innovation procedure. In this regard the Management Risk Assessment and Sponsorship form must be completed and submitted to Research & Innovation. Further information can be provided by Research & Innovation www.strath.ac.uk/ri/grantscontracts/ethicssponsorship/.

Further Notes

1.	If the investigation is within the remit of the UEC and there is any variation to any aspect of the investigation (location, investigators, methodology, risks, etc.) then the Secretary to the Ethics Committee should be notified in writing immediately and the Ethics Committee (or Convener of the Ethics Committee acting on behalf of the UEC) given time to consider these. Research & Innovation should also be notified in this instance as any sponsorship decision may be affected. There are implications to insurance cover of carrying out work which has not been ethically approved.
2.	Should anything occur during the project which may prompt ethical questions for any similar projects the Chief Investigator should notify the Ethics Committee.

3.   Insurance, sponsorship and other approval requirements from appropriate external bodies must also be in place before the project can commence.

For applications to the University Ethics Committee the completed form should be sent (with electronic signature) to ethics@strath.ac.uk in the first instance.

Before submitting your application please check your documentation specifications:

Has a consent form and a participant information sheet been developed and attached for every group of participants?

Are the consent forms and information sheets to be used easily understood by all potential participants?

Does the consent form seek consent for each relevant procedure?

Does the consent form make clear that participants are free to withdraw at any time without giving reason and (if appropriate) without affecting their situation (e.g. school, work, care, treatment, etc)?

Does the information sheet contain contact details of the investigators?

Will participants have adequate time to consider their involvement prior to giving informed consent?

Do the consent forms, participant information sheets, advertisements and correspondence carry the appropriate University logo?

Are questionnaires pitched at the appropriate level for participants?

Appendix J	Sultan Idris Education University Permission/Approval

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SULTAN IDRIS EDUCATION UNIVERSITY

Fakulti Perniagaan dan Ekonomi	Rujukan Tuan	: FPE/K1029/2010(03)
	Rujukan Kami	: May, 12 2010
	Tarikh	:

Mr. Mohd Nazir Bin Md Zabit
Department of Educational and Professional Studies
Faculty of Education
University of Strathclyde
Jordanhill Campus
76 Southbrae Drive
Glasgow G13 IPP
United Kingdom

Mr,

AN APPROVAL TO CONDUCT INTERVENTION OF THE PEA3063 – POPULATION ECONOMICS AND POLICY (SEMESTER 1, SESSION 2010/2011)

Your letter dated April 18, 2010 regarding the above matter refers.

I am pleased to inform you that the Faculty has no objection for you to conduct the intervention as per request.

Please contact Dr Mohd Yahya Husin personally for discussion about students/participants, administration of classes and other matters.

I wish you the best of luck in your studies.

Thank you.

Yours sincerely,

NORLIA NORWANI, PhD
Dean

c.c   Academic Division, UPSI
       Staff file
       Dr. Mohd Yahya Husin

Appendix K	Student Informed Consent

Mohd Nazir Md. Zabit
Department of Education and Professional Studies
Faculty of Education
University of Strathclyde
Jordanhill Campus
76 Southbrae Drive
Glasgow G13 1PP
United Kingdom

Mr/Mrs/Miss/Ms,

The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia

I refer to the matter above.

I am a lecturer in the Faculty of Education and Human Development, Sultan Idris University of Education (UPSI) and also a Ed.D candidate (Doctor of Education) at the University of Strathclyde, United Kingdom. The topic of my research is "The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia". To fulfill the dissertation requirements for my Ed.D research, I would need to collect data from students in the PEA3063 - Population, Economics and Policy course at the Faculty of Business and Economics, UPSI.

As such, I would like to invite you to voluntarily participate in this study which would be conducted for 14 weeks starting from the beginning of Semester 1, Session 2010/2011 (July – September 2010). There are no risks involved as regards to your participation in this study as all personal information would be classified and the data acquired would only be used for academic purposes.

Your participation would be much appreciated as it would be beneficial for the development of the Business Education curriculum in the Faculty of Business and Economics, UPSI, specifically for the PEA3063 – Population, Economics and Policy subject.

Thank you.

Mohd Nazir Md. Zabit

SURAT PERMOHONAN PERSETUJUAN SEBAGAI PESERTA KAJIAN

Mohd Nazir Md. Zabit
Department of Education and Professional Studies
Faculty of Education
University of Strathclyde
Jordanhill Campus
76 Southbrae Drive
Glasgow G13 1PP
United Kingdom

Saudara/i,

The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia

Perkara di atas adalah dirujuk;

Saya merupakan Pensyarah di Fakulti Pendidikan dan Pembangunan Manusia dan juga calon ijazah Ed.D (Doctor of Education) di University of Strathclyde, United Kingdom. Tajuk kajian yang saya jalankan adalah The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia. Bagi menyempurnakan disertasi untuk kursus Ed.D yang sedang saya jalani, memerlukan saya mengumpulkan data dari pelajar-pelajar PEA3063 – Population, Economics and Policy di Fakulti Perniagaan dan Ekonomi, Universiti Pendidikan Sultan Idris.

Oleh yang demikian anda dipelawa secara sukarela untuk terlibat dalam kajian ini yang akan dilakukan selama 14 minggu bermula dari awal hingga akhir Semester 1, Sesi 2010/2011 (Julai – September 2010). Tiada risiko yang akan anda hadapi dari penyertaan dalam kajian ini kerana segala maklumat diri anda akan dirahsiakan dan maklumat yang diperolehi hanya digunakan untuk tujuan akademik semata-mata.

Sumbangan diri anda sangat dihargai kerana ia memberi manfaat besar kepada perkembangan kurikulum Pendidikan Perniagaan di Fakulti Perniagaan dan Ekonomi, Universiti Pendidikan Sultan Idris khususnya mata pelajaran PEA3063 – Population, Economics and Policy.

Sekian, terima kasih.

Saya yang menurut perintah,

Mohd Nazir Md. Zabit

PENGESAHAN KEBENARAN

Dengan ini saya bersetuju untuk menjadi seorang peserta dalam kajian bertajuk **"The Implementation and Impact of Problem-Based Learning on Students' Critical Thinking Skills in Teaching Business Education in Malaysia"** secara sukarela untuk tujuan perkembangan kurikulum Pendidikan Perniagaan.

Nama   : _____

Tandatangan : _____

Tarikh: : _____

Appendix L	Insight Assessment Inc. Permission

Print - Close Window

Subject:	RE: Critical Thinking Tests for EdD research
From:	Dee August (dee@insightassessment.com)
To:	nazirzabit300@yahoo.co.uk;
Date:	Friday, 26 March 2010, 20:08

Dear Mohd Nazir Zabit:

Thank you for your interest in possibly using one of our critical thinking assessment instruments in your work. We do, under a strict qualification program, sometimes permit doctoral students to use these instruments in their dissertation research. The procedure for qualifying for access to our instruments is outlined on our website www.insightassessment.com on the pulldown menu entitled 'How to Purchase' on the link "Dissertation Research Pricing." There you will see that we must receive a completed dissertation pricing form (also appended here) as well as a letter from your dissertation advisor on University of Strathclyde letterhead assuring their willingness to supervise your ethical use of the instrument as well as the protection of the instrument. You should read all of the material on this link, as we will require that you make all the mentioned assurances if you are permitted to purchase. While these restrictions may seem harsh, they are intended to protect our current clients, many of whom use these instrument for high stakes purposes.

In terms of translation of the instrument to the Malay Language, we have attached a copy of our translation policies and if, after reading this document, you remain interested in undertaking a translation of one of the instrument, I am willing to contact one of the test author's to see if they have availability to begin the project with the expectation of reaching a completed and approved translation by your expected testing time of June 2010. Please contact me again at your earliest convenience in this regard and send a completed copy of the memo of understanding to my attention. If it is more convenient this can be faxed to the number below. If you become a colleague translator, your work is acknowledged on the test and on the website as a collaborating translator and a further discount is applied to your test costs. This translator discount will remain available to you in future uses of the test for your ongoing research.

Please contact me to let me know that you have received this message as sometimes they are caught by spam filters or firewalls because of the attachments.

Best regards,

Dee August, PhD

From: Info Staff [mailto:info@insightassessment.com]
Sent: Friday, March 26, 2010 8:53 AM
To: 'Dee August'
Subject: FW: Critical Thinking Tests for EdD research

Dr. August:

This is a doctoral student with a translation request. As yet we have received no doctoral student application for access and no advisor letter from this student.

Info Staff

Insight Assessment

650-697-5628 : 24 hr response line

Measuring Critical Thinking Worldwide

From: Mohd Nazir [mailto:nazirzabit300@yahoo.co.uk]
Sent: Friday, March 26, 2010 3:32 AM
To: info@insightassessment.com

From: Mohd Nazir [mailto:nazirzabit300@yahoo.co.uk]
Sent: Friday, March 26, 2010 3:32 AM
To: info@insightassessment.com
Subject: Critical Thinking Tests for EdD research

Hello,

I'm a Ed.D student at University of Strathclyde, UK and I would like to know how I can acquire this instrument for my studies. I really need this instruments because I will conduct my study on June 2010.

For your information, I intend to translate this instrument to Malay Language (Malaysia).

Thanks.

Mohd Nazir Zabit

Department of Educational and Professional Studies

Faculty of Education

University of Strathclyde

Print - Close Window

Subject:	RE: CCTST CapScore Report
From:	Dee August (dee@insightassessment.com)
To:	nazirzabit300@yahoo.co.uk;
Date:	Wednesday, 8 December 2010, 20:37

Dear Dr. Mohd Nazir Zabit:

Here are reports of your individual and group scores from your recent return of CapScore response forms for Basic CapScore Reporting service.

The attached Excel file reports each of the test-takers' responses to demographic questions and each of the test-takers' scores for all of the test instrument's scales.

The document files reports basic descriptive statistics summarizing the overall results of your groups. Except for the total score, histograms for specific scales are truncated at the highest score achieved by a member of your testing group.

To further assist you we have also included a PDF file with additional interpretive guidelines.

Training programs and curricula to strengthen critical thinking can be developed by reference to the detailed description of each of each skill and sub-skill that appears as Appendix 2 of the User Manual.

Appendix M	Publication Arising from this Dissertation

Proceeding Paper and Poster Presentation

Mohd Nazir Md Zabit (2009). Problem-Based Learning on Students' Critical Thinking Skills In Teaching Business Education In Malaysia: A Literature Review. 2009 European College Teaching and Learning Conference, 8-11 June, Prague, Czech Republic.

Mohd Nazir Md Zabit & Eleni Karagiannidou (2010). A Proposed Study of Problem-Based Learning Implementation on Students' Critical Thinking Skills in Malaysia. Poster presentation - University of Strathclyde Research Day 2010, June 6.

Mohd Nazir Md Zabit & Eleni Karagiannidou (2011). The Effects of Problem-Based Learning on Business Education Students' Critical Thinking Skills in a Malaysian University, 13th Annual International Conference on Education, 23-26 May, Athens, Greece.

Mohd Nazir Md Zabit & Eleni Karagiannidou (2011). Fostering of Business Education Students' Critical Thinking Skills Through Problem-Based Learning in Malaysian Universities: A Quasi-Experimental. FACiLiTATE, the Irish Enquiry and Problem Based Learning Network,First International Conference : 'Problem Based Learning (PBL): Today & Tomorrow', 26-27 May, Trinity College, Dublin.

Journal Article

Mohd Nazir Md Zabit (2010). Problem-Based Learning On Students' Critical Thinking Skills In Teaching Business Education In Malaysia: A Literature Review. American Journal of Business Education, 30(6), 19-32.