

**RELATIONSHIP BETWEEN PROBLEM-BASED LEARNING
EXPERIENCE AND SELF-DIRECTED LEARNING READINESS**

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A project report submitted in partial fulfillment of the requirements for
the award of the Degree of
Master of Technical and Vocational Education

Faculty of Technical Education
Universiti Tun Hussein Onn Malaysia

APRIL, 2007

For my loving parents. Thank you for always being there for me.



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ACKNOWLEDGEMENTS

First and foremost, I would like to thank my wonderful supervisor, P.M. Dr. Maizam bt. Alias, for her invaluable advice, encouragement, help, and support for me to finish this study. Thank you again for your trust and faith in me throughout this study. Without your help, life would have been very bleak indeed.

I would like to recognize the significant contribution from the lecturers, staffs, and students from the Faculty of Electrical and Electronics Engineering, Faculty of Technical and Vocational Education, Faculty of Civil and Environmental Engineering, and Faculty of Multimedia and Information Technology for assisting me in this study. Thank you also to all my friends who have helped and supported me in this study, especially Muhammad Rahmat b. Md. Padzil and Wan Izyani bt. Wan Jusoh.

Finally, I especially thank my family who has given me the moral support, advice, and their blessings for me to successfully finish this study.



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ABSTRACT

Tun Hussein Onn University of Malaysia (UTHM) has been implementing Problem-Based Learning (PBL) to some degree in various subjects. However, to this day no empirical data has been gathered on the effectiveness of PBL as a methodology to develop self-directed learning (SDL) skills. The purpose of this study is to investigate self-directed learning readiness (SDLR) among UTHM students exposed to varying PBL exposure intensity. SDLR was measured using the modified version of Self-Directed Learning Readiness (SDLRS). Participants in this study were first-year undergraduate students at UTHM. The instrument was administered to students in Electrical and Electronics Engineering, Civil and Environmental Engineering, and Technical Education ($N=260$). Data were analyzed using descriptive and inferential statistical techniques with analysis of variance (ANOVA) and the independent *t*-test for equal variance for hypotheses testing. The results of this study indicate that overall SDLR level increase with PBL exposure up to exposure intensity twice, beyond which no increase in SDLR was observed with increase in PBL exposure. Within the same academic programme, results did not show a statistically significant difference of SDLR level between groups exposed to varying PBL exposure intensity. However, significant difference was found in some dimensions of the SDLR for the Technical Education students. Within the same education background, results did not show a statistically significant difference of SDLR level between groups exposed to varying PBL intensity. However, significant difference was found in some dimensions of the SDLR for students with both Matriculations and STPM background. A statistically significant difference of SDLR level was found between Electrical Engineering and Technical Education students for exposure once and in some SDLR dimensions. No statistically significant difference was found between students from different academic programme for exposure twice or thrice. The data supports the conclusion that SDLR level increases with increase in PBL exposure intensity up to a certain extent only, beyond which no increase of SDLR can be observed. The data also suggest that only certain dimensions of the SDLR improve with increased exposure to PBL.

ABSTRAK

Universiti Tun Hussein Onn Malaysia (UTHM) telah melaksanakan Pembelajaran Berasaskan-Masalah (PBL) sehingga ke sesuatu tahap di dalam pelbagai subjek. Walau bagaimanapun, sehingga hari ini tiada data empirikal dikumpul mengenai keberkesanan PBL sebagai suatu metodologi dalam membangunkan kemahiran pembelajaran terarah sendiri (SDL). Tujuan kajian ini adalah untuk menyelidik kesediaan dalam pembelajaran terarah sendiri (SDLR) bagi pelajar-pelajar di UTHM yang terdedah pada keamatan pendedahan terhadap PBL yang berbeza-beza. Responden bagi kajian ini adalah pelajar-pelajar Ijazah Sarjana tahun pertama di UTHM. SDLR diukur menggunakan Skala Kesediaan dalam Pembelajaran Terarah Kendiri (SDLRS) yang telah diubah suai. Instrumen tersebut diagihkan kepada pelajar-pelajar Kejuruteraan Elektrik dan Elektronik, Kejuruteraan Awam dan Alam Sekitar, dan Pendidikan Teknikal ($N = 260$). Data telah dianalisa menggunakan teknik statistik deskriptif dan inferensi menggunakan *analysis of variance* (ANOVA) dan *independent t-test for equal variance* bagi menguji hipotesis kajian. Dapatan kajian ini mendapati secara keseluruhannya tahap SDLR meningkat seiring dengan pendedahan PBL sehingga keamatan pendedahan dua kali, seterusnya tiada peningkatan SDLR diperhatikan dengan peningkatan pendedahan terhadap PBL. Di dalam program akademik yang sama, dapatan tidak menunjukkan perbezaan signifikan secara statistik pada tahap SDLR di antara kumpulan-kumpulan yang terdedah pada keamatan pendedahan PBL yang berbeza-beza. Walau bagaimanapun, terdapat perbezaan signifikan pada dimensi SDLR tertentu bagi pelajar-pelajar dari Pendidikan Teknikal. Di dalam latar belakang pendidikan yang sama, dapatan tidak menunjukkan perbezaan signifikan secara statistik pada tahap SDLR bagi pelajar-pelajar dari kedua-dua latar belakang Matrikulasi dan STPM. Walau bagaimanapun, terdapat perbezaan signifikan pada dimensi-dimensi SDLR tertentu untuk pelajar-pelajar dari kedua-dua latar belakang Matrikulasi dan STPM. Pada pendedahan sekali, terdapat perbezaan signifikan secara statistik pada tahap SDLR di antara pelajar-pelajar dari Kejuruteraan Elektrik dan Pendidikan Teknikal serta dalam beberapa dimensi SDLR. Tiada perbezaan signifikan secara statistik didapati di antara pelajar-pelajar dari program akademik yang berlainan pada pendedahan dua kali atau tiga kali. Data menyokong kesimpulan bahawa tahap SDLR meningkat seiring dengan peningkatan keamatan pendedahan terhadap PBL sehingga pada sesuatu takat sahaja, seterusnya tiada peningkatan SDLR dapat diperhatikan. Data juga mencadangkan hanya dimensi SDLR tertentu sahaja yang meningkat seiring dengan peningkatan pendedahan terhadap PBL.

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LIST OF ABBREVIATIONS

α	-	Reliability
ANOVA	-	Analysis of variance
Ex0	-	No exposure
Ex1	-	Exposure once
Ex2	-	Exposure twice
Ex3	-	Exposure thrice
PBL	-	Problem-Based Learning
SDL	-	Self-directed learning
SDLR	-	Self-directed learning readiness
SDLRS	-	Self-Directed Learning Readiness Scale
SDLRS-A	-	Self-Directed Learning Readiness Scale- Adult version
STPM	-	<i>Sijil Pelajaran Tinggi Malaysia</i>
UTHM	-	Universiti Tun Hussein Onn Malaysia
LOL	-	Love of learning
Tolerance	-	Tolerance of risk, ambiguity, and complexity in learning
Selfconcept	-	Self-concept as an effective learner
Responsibility	-	Responsibility for one's own learning
Selfunderstanding	-	Self understanding of one's own learning
Initiative	-	Initiative in learning
Hardwork	-	Acceptance of hard work
Lifelong	-	View of learning as a lifelong beneficial process

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CHAPTER I

INTRODUCTION

1.1 Introduction

The concept of self-directed learning (SDL) is one which educators have investigated and discussed for many years. SDL has its roots in adult education and has been heralded as one of the theories for adult-learning. It has been described as a process (Conlan, Grabowski & Smith, 2003), a psychological predisposition of the learner (Reio & Davis, 2005), a learning environment, autodidacticism, and goals (Ainoda, Onishi & Yasuda, 2005). An extensive study by Candy (1988) concluded that self-direction in learning has been used as: (1) a personal quality or attribute (personal autonomy), (2) as the independent pursuit of learning outside formal settings (autodidaxy), and (3) as the way of organizing instruction (learner-control) (Candy, 1988, cited in Brockett and Heimstra, 1991a).

One of the most common definitions of SDL was developed by Knowles (1984). Knowles (1984) described SDL as a process "...in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes." (Knowles, 1984). Knowles elucidated this process are labeled 'self-planned learning', 'inquiry method', 'independent learning', 'self-education', 'self-instruction', 'self-study', and 'autonomous learning' as found in the literature. He stated that most of these labels seem to imply learning in isolation, where as in SDL, "...learning usually takes place in association with various kinds of helpers, such as

instructors, tutors, mentors, resource people, and peers” (Knowles, 1984). In SDL, the role of the teacher shifts to become a facilitator or instructor, rather than to direct the learning.

Another effort made to describe SDL was by Oddi (1985). Oddi described SDL as a personality characteristics of individuals “... whose learning behavior is characterized by initiative and persistence in learning overtime through a variety of mode” (Oddi, 1985, cited in Brockett and Heimstra, 1991b). Oddi identified three components or clusters that she hypothesized as being the essential personality dimensions of SDL, which are: (1) proactive drive versus reactive drive, (2) cognitive openness versus defensive openness, and (3) commitment to learning versus apathy or aversion to learning.

Candy (1988) summarizes the characteristics of the directed learner fall into two categories: attributes and skills (Candy, 1988, cited in Brockett and Heimstra, 1991a). Guglielmino (1977) cited in Guglielmino and Guglielmino (2003) describes a learner who is likely to be successful in SDL, based on a three-round Delphi survey process involving 14 individuals considered to be experts on SDL, as follows:

“A highly self-directed learner is one who exhibits initiative, independence, and persistence in learning; one who accepts responsibility in his or her learning and view problems as challenges, not obstacles; one who is capable of self-discipline and has a high degree of curiosity; one who has a strong desire to learn or change and is self-confident; one who is able to use basic study skills, organize his or her time, set an appropriate pace for learning, and develop a plan for making it work; one who enjoys learning and has a tendency to be goal-oriented.” (Guglielmino, 1977, 1978, cited in Guglielmino and Guglielmino, 2003)

Clearly, much debate has been done to clarify the concept of SDL. A study of the literature reveals a variety of definitions to describe SDL. In spite of this, and the fact that its definition had undergone some changes throughout the passage of time, it

can be concluded that SDL can be perceived as both a process and personal attributes/skills (Brockett and Heimstra, 1991a; Siaw, 2001).

Brockett and Heimstra (1991b) described SDL under an umbrella concept which recognizes both the process and personal attributes of the learner, namely process orientation and personal orientation, which are two related dimensions of SDL. The process orientation, otherwise known as *external factors*, is where the learner assumes primary responsibility for planning, implementing, and evaluating the learning process. It refers to an instructional method in which an education agent or resource often plays a facilitating role. The second dimension, known as the process orientation (or *internal factors*), relates to the learner's characteristics that predispose him or her towards taking primary responsibility for personal learning endeavors. Both the process and personal orientation are encapsulated into a theoretical model called the "Personal Responsibility Orientation" Model (PRO) proposed by Brockett and Heimstra (1991b), which substantiates both Knowles' and Candy's theories of SDL. This theoretical framework proposed by Brockett and Heimstra (1991b) is the basis of the current study.

1.2 SDL methodology : Problem Based Learning (PBL)

In the effort to promote the andragogical perceptive of SDL, academicians and researcher alike studied various teaching methodologies in an effort to empirically validate the learning outcomes of SDL. Out of various teaching methodologies, Problem Based Learning (PBL) emerged as one of the significant method of enacting the principles of SDL among learners (Boud & Feletti, 1997, cited in Walker and Lofton, 2003); Graaff & Kolmos, 2003; Graaff, n.d.; Savery, 2006; Helmo-Silver, 2004). SDL is considered to be the core concept in PBL (Silen and Uhlin, 2004).

PBL originated from medical education in the Faculty of Medicine at McMaster University in Canada during the mid 1960's. It has been sub sequentially adopted by medical schools at other universities such as the University of Limburg at Maastricht (Netherlands), the University of Newcastle (Australia), and the University

of New Mexico (United States of America). Nowadays, we are seeing the explosion of PBL in various adaptations especially in engineering education (Khairiyah et al., 2005; Ping, 2005; Yong, 2005; Afandi Ahmad, 2006), business education (Siaw, 2001), multimedia and ICT (Ellis et al., 1998; Nor Ratna Masrom, 2006), and dentistry (Lohman & Finkelstein, 2000).

PBL was grounded in the constructivist framework where learning is believed to be most effective when students are actively involved and learn in the context in which knowledge is to be used (Savery & Duffy, 1995). Three primary constructivism principles, according to the authors are: understanding comes from our interactions with our environment, cognitive conflict stimulates learning and learning evolves through social negotiation and evaluation of the viability of individual understandings. The philosophy behind PBL is that students gain both content and thinking strategies through the experience in solving problems. The teacher acts as a facilitator to guide the learning process rather than as a provider of knowledge which promotes 'spoon-feeding' in the traditional learning environment (Kwan, 2000; Hmelo-Silver, 2004). PBL is also said to be a set of approaches under the broader category of inquiry-based learning, where learning begins with the curiosity of the learner (Barett, 2005; Savery, 2006), and is also related closely to other instructional strategies such as case-based learning and project-based learning (Savery, 2006; Graaff, n.d.). The concept of PBL is also known to be closely related to Kolb and Dewey experiential learning (Graaff & Kolmos, 2003; Hmelo-Silver, 2004).

Numerous attempts have been made to define the theoretical principles that underline PBL. For instance, Savery (2006) described that the critical success and factors to the implementation of PBL is the selection of ill-structured problems and a tutor who guides the learning process. Guzelis (2006) defines PBL is a total learning approach in education, both a curriculum and a process curriculum that consists of carefully selected and designed problems. The author stated that the problems demand the learner acquisition of critical and creative knowledge, problem-solving proficiency, self-directed learning strategies and team participation skills. Helmo-Silver (2004) described PBL as an instructional method in which students manage

their learning goals and strategies to solve ill-structured problems (problems with no single correct answer) and acquire skills needed for lifelong learning. Students work in collaborative groups to identify what they need to learn in order to solve the problems, engage in self-directed learning, apply their new knowledge to the problem, and reflect on what they learned and the effectiveness of the strategies they applied.

Based on the review of the literature, the principles underlying PBL can be summarized as follows:

- i. The use of ill-structured, cross-disciplinary, complex, real-world problems that allow inquiry and with any number of correct solutions.
- ii. The problem is encountered first and used as the focus from which the learning is structured.
- iii. Self-directed learning is primary. Students must have responsibility for their own learning and acquisition of both information and knowledge.
- iv. Problem is presented to the students without direct instruction of how to solve it. However, resources and scaffolding are made available for the students to solve the problems themselves.
- v. Harnessing of a variety of knowledge sources and the use and evaluation of information sources are essential PBL processes.
- vi. Emphasis is on meaning and not on facts.
- vii. Collaboration is essential. Students work in small groups, with the help of a facilitator.
- viii. PBL fosters collaboration, stresses on development of problem-solving skills, self-directed learning, and increases motivation.
- ix. Self and peer assessment should be carried out at the completion of each problem and at the end of every curricular unit.
- x. What students learn during their self-directed learning must be applied back to the problem with reanalysis and resolution.
- xi. A closing analysis of what has been learned from work with the problem and a discussion of what concepts and principles have been learned is essential.

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