Analysis of the Psychological Impact of Problem Based Learning (PBL) towards Self Directed Learning among Students in Undergraduate Medical Education

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Abstract

The psychological impact of a learning tool towards self directed learning is an important outcome of medical education. Although problem based learning is believed to facilitate self directed learning, previous studies have reported conflicting results. This longitudinal survey explored the perceived psychological changes in self directed learning for two and a half years in an undergraduate phase 1 medical education program with an integrated problem-based learning curriculum. 170 of 200 students (response rate, 85%) completed the Self-Directed Learning Readiness Scale at five different time points: at the beginning of each semester year and at program completion. Scores were significantly lower during the first semester compared with other years, and fifth semester scores were significantly higher than in previous years. Scores on the three subscales (i.e., self-management, desire for learning, and self-control) increased significantly during the five semesters years of the programme. These findings support self-directed learning as a maturational process seen psychologically by the students. Implications for medical faculty and curriculum development are discussed.

Keywords: Self directed skills, Problem based learning, Medical curriculum

1. Introduction

The proliferation of information and technology and the accelerated rate of change in all aspects of life have led to increased recognition of the importance of lifelong self-directed learning (SDL). Self-directed learning is described as one of the most significant elements in today's information-oriented society (Williams, 2001, 2004). Educational institutions at all levels have added the development of lifelong self-directed learners to their mission and goal statements (Long & Guglielmino, 2004). However, Candela, Dalley, and Benzel-Lindley (2006) concluded that despite calls for reform in the past 30 years, many medical curricula continue to center on content rather then the process of learning, with traditional teacher-centered instruction still widely used in medical schools.

Problem-based learning (PBL) is one approach that shifts the focus from teacher-centered to learner-centered education and is believed to facilitate SDL (Rideout & Carpio, 2001). This study examined the development of SDL in the same student group throughout their 5 semesters of phase 1 medical education within a PBL curriculum.

1.1 Self-Directed Learning

The definition of SDL varies throughout the literature, with the term often used interchangeably with educational concepts such as lifelong learning, active or independent learning, and student-centered education (Ainoda, Onishi, & Yasuda, 2005). The most common definition is that of Knowles (1975), who defined self-directed learning as a process in which individuals take the initiative, with or without the help of others, to diagnose their learning needs, formulate learning goals, identify human and material resources for learning, choose and implement appropriate learning strategies, and evaluate learning outcomes. In SDL, the role of the teacher is to support students during the teaching-learning process (Crooks, Lunyk-Child, Patterson, & LeGris, 2001;

Schmidt, 2000). Self-directed learning also provides flexibility to students about their learning approaches (Hewitt-Taylor, 2001), and control over both the learning objectives and the means of learning is advocated by some authors (Lowry, 1989). However, SDL does not mean learning in isolation, but rather advocates the use of experts as facilitators and resources (Kell & Van Deursen, 2000).

1.2 Problem-Based Learning

Self-directed learning is an integral component of the PBL instructional approach (Hmelo-Silver, 2004). Williams (2001) asserted that PBL cannot occur in the absence of SDL, whereas Boud and Feletti (1997) stated PBL has been one of the most powerful teaching methods to encourage students to take responsibility for their own learning. Increasing SDL skills during professional education is one stated objective of PBL, as it helps students effectively obtain and use knowledge and prepare for their professional careers (Barrows, 1983; Morrison, 2004; O'Shea, 2003).

The essential components of SDL are apparent in the PBL process, in which students follow these steps (Rideout & Carpio, 2001):

- * Review the scenario and generate hypotheses.
- * Identify their learning issues.
- * Confirm the resources they will access.
- * Perform their own information seeking.
- * Apply their new learning and reflect on the content and process of learning.

Problem-based learning with its emphasis on SDL is viewed as an appropriate method for developing the attitudes and skills to cope with ever-changing environments.

1.3 Problem-Based Learning and Self-Directed Learning

Most quantitative research of the development of SDL within PBL has been cross-sectional, and much of it has focused on self-directed learning readiness (SDLR) of students using the SDLR scale originally developed by Guglielmino in 1977 and reviewed by Guglielmino in 1989. Conflicting results have been reported from studies with engineering, medical, and nursing students; some studies indicated an increase in SDL readiness among PBL students (Dieber 1994; Litzinger, Wise, & Lee, 2005; Shokar, Shokar, Romero, & Bulik, 2002). A recent study with nursing students in a PBL curriculum found no significant difference in overall SDLR level after 1 year of education (Williams, 2001), although qualitative results from the same study revealed students described the development of many of the characteristics associated with SDL. Another study with medical students reported no significant change in SDLR scores (Harvey, Rothman, & Frecker, 2003), whereas Walker and Lofton (2003) reported a decrease in SDLR scores of PBL students in the first 16 weeks of their pharmacy education.

Questions concerning the validity, cost, and usefulness of the SDLR scale led to the development of the Self-Directedness Learning Readiness scale by Fisher, King, & Tague (2001). A Turkish translation of the scale has been used in a series of cross-sectional studies in the program where this study was conducted (Kocaman, Dicle, Ustun, & Cimen, 2006). The SDLR scores of fourth-year students were significantly higher than those of first-year students (Gönülal & Bahar, 2005; Özbodur & Elçigil 2005), and a significant increase in SDLR scores was noted at the end of the first semester of the first year (Gördes & Bahar, 2005). Nursing researchers also have used qualitative approaches to study the development of SDL within a PBL curriculum and found students generally described increasing responsibility for learning (Lunyk-Child et al., 2001; Ryan, 1993).

In summary, although most research studies support a positive relationship between use of the PBL educational approach and SDLR, they have primarily been cross-sectional. This study aimed to add to our understanding of that relationship by answering the following research questions:

* What is the change in SDLR mean scores throughout 5 semesters of phase 1 medical education in an integrated PBL curriculum?

* What are the changes in mean scores on the three SDLR subscales (i.e., learning desire, self-management, and self-control) in the two and a half years of medical education in an integrated PBL curriculum?

2. Method

2.1 Study Design and Sample

The study was conducted at International Medical University, Kuala Lumpur, Malaysia in the phase 1 basic medical science campus. An integrated PBL curriculum has been used at the school for the past 10 years with the following characteristics:

* Problem-based learning occurs within small groups eight to ten students facilitated by a faculty tutor, whose role includes encouragement of student learning and participation.

* The program is divided into a series of 11 modules, with several PBL sessions devoted to exploration of patient scenarios. The scenarios are prepared by medical faculty and represent common health issues across the life span. Clinical skills practice and lectures complement the PBLs in each module.

* Communication, ethical issues, critical thinking, assessment, and technical skills are integrated into each module and all levels of the curriculum as core competencies and knowledge.

* Major concepts in this curriculum are person, environment, health, and nursing.

* Courses initially focus on health promotion with the medical role concentrated on enhancing the health of individuals and groups. As students progress in the program, the focus changes to care of patients during illness, with the emphasis on optimizing health status.

* Student evaluation is considered an essential part of the educational program and includes medical knowledge and skills, problem solving ability, self-directed learning, and group participation. Evaluation methods include written assignments, self-evaluations and tutor evaluations of performance, and in-course and end-of-semester examinations.

A longitudinal correlational design was used, and 170 of the 200 students (RR, 85%) who enrolled in the program in August 2007 participated at each of five time points (at the beginning of each academic year and at program completion) and were included in the data analysis. All of the students entered the program directly from secondary school. Average age of students in the first year was 19.3 (SD = 1.4). Ethical approval was obtained from the research and ethics committee. Students were informed about the study prior to agreeing to participate and were assured that their participation in the study was entirely voluntary. All results were confidential and not available to anyone other than the research team.

2.2 Instrument

The SDLR scale, designed by Fisher et al. (2001) and adapted to Turkish and tested for psychometric properties by Kocaman et al. (2006), was used to collect data. The 40-item scale uses a 5-point Likert scale to determine the degree to which each item applies to the participant, ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument includes three subscales: self-management (13 items) related to learning process activities, desire for learning (12 items) associated with taking responsibility for learning, and self-control (15 items) related to control of the learning process.

High reliability was reported for the original scale (Fisher et al., 2001) and in the present study, with reliability coefficients of 0.94 for the total scale and 0.87, 0.86, and 0.88 for the subscales. The minimum score for the 40-item scale is 40 with a maximum score of 200. High scores represent high levels of SDLR with a total score of 150 indicating readiness for self-directedness (Fisher et al., 2001). The questionnaires were administered during regular PB time by the facilitator within the first week of each module of the programme and after the completion of the module.

SPSS version 15.0 software was used for all data analysis. Differences of SDLR scores during the study period were tested with repeated measures analysis of variance. Bonferonni correction was used to determine which group, if any, was significantly different from another group.

3. Results

There were significant differences in the mean SDLR scores of medical students according to semester in the program, with an increase in scores at each time point. Further analysis (i.e., Bonferroni statistical correction method, used to address the problem of multiple comparisons) revealed SDLR mean scores were significantly lower for the first semester than for other semesters. Fifth semester scores were significantly higher than other semesters; SDLR scores in second and third and fourth semesters were similar with means (SD) as follows: T1 = 160 (16.5); T2 = 175 (14.0); T3 = 175 (13.6); T4 = 184 (10.6); T5 = 185 (12.1), p < 0.01. The T represented the mean number of respondents per semester, with SD in brackets.

There also were significant differences in the three SDLR subscale scores according to programme semester (Table 1). First-semester SDLR scores were significantly lower than other semesters, fifth semester scores were significantly higher than other semesters, and second and third and fourth semesters scores were at a similar level according to further analysis (Bonferroni statistical correction method).

Insert table 1 here.

4. Discussion

In this study, the mean score of students at the beginning of the programme was greater than 150, indicating a readiness for SDL (Fisher et al. 2001). The SDLR scores were significantly higher at the beginning of students' second semester and increased further in the fourth and fifth semester. Previous cross-sectional studies in other programmes reported similar findings (Gönülal & Bahar, 2005; Özbodur & Elçigil, 2005). Our findings also corroborate results of a positive relationship between PBL and SDLR with students in different disciplines including engineering (Litzinger et al., 2005) and medicine (Dieber, 1994; Shokar et al., 2002) students.

Our results also are congruent with the findings from qualitative research in several psychological aspects of the students, in which students described changes in perception and satisfaction with SDL over time. Williams (2004) reported a process of change from feelings of uncertainty and being overwhelmed to feelings of confidence and commitment. Students in another study by Lunyk-Child et al. (2001) also described changes, from negative feelings at the beginning of their studies to positive comments about SDL when they completed their program. The students described the important role of facilitators to guide and support them during the transformation period to becoming effective and satisfied self-directed learners. The faculty members in our school of medicine are aware of the importance of their role in the adaptation to SDL, and ongoing faculty development has emphasized their facilitative and supportive role in self-directed PBL.

The maturational process of developing self-directedness suggested by our findings is congruent with theoretical perspectives on the topic. Grow (1991) described SDL as having four stages: dependent, interested, participator, and self-directed. Similarly, Kasworm (1992) suggested the process to increased self-directedness has five stages, from a passive and authority-oriented focus to active inquiry, critical appraisal of information, and the use of multidimensional strategies for planning and conducting learning activities.

The significant changes in SDLR scores between the first 2 semesters and the third and fourth and fifth semesters and the lack of change in SDLR scores of students between the second and third semesters be related to the particular foci of the programme in those years. In the first year, students are introduced to the roles, functions, and foundation knowledge of becoming a doctor, as well as the expectations and process of PBL and SDL. The increase in mean SDLR scores between the first and second semesters likely reflects the acceptance and psychological adjustment to the learning approach and the appreciation of the importance of SDL to success in the program.

The lack of change in scores between the second and third and fourth semesters may indicate that students have entered a steady state in which there is less focus on learning how to learn within the PBL process. Scenarios in the second and third and fourth semesters focus on common health issues and related patient, family, and community medical needs, and students have clinical practice in a variety of health care settings.

As students enter their final semester, the programme changes again. With students spending the majority of their time in clinical practice with 1 day per week of class where they are responsible for facilitating discussion on clinical situations of their choosing. This increased emphasis on self-responsibility and relative independence in clinical practice likely contributes to the increased SDLR scores of students as they enter their final year of the program and prepare to begin their nursing careers. Certainly, faculty expectations and curriculum focus are significant factors in student behaviors, and this is no doubt reflected in the changes in SDLR scores over time (Benson, Noesgaard, & Drummond-Young, 2001; Kell & Van Deursen, 2002).

Similar trends to increasing SDLR were noted in the increasing mean scores of the subscales. In Garrison's (1997) model, the basic concepts of SDL are the dimensions of control, responsibility, and motivation, and the subscales of the SDLR scale reflect these dimensions. The PBL process also reinforces these dimensions, as students become increasingly responsible for identifying and pursuing their learning goals.

5. Conclusion and Recommendations

Our results indicate student psychological perceptions of self-directed learning readiness increase with time in the programme. The results also support the view that becoming self-directed is a maturational process. It also appears that levels of faculty support and clear expectations of students impact on students' perceptions of their self-directedness. This has implications for educators. Making the development of self-directed skills an explicit

expectation of students is important. Providing support and encouragement in the early years of the program and facilitating increasing independence in later years is also suggested by our findings.

This study was limited by a lack of comparison with medical students enrolled in more traditional programs. Perhaps students in all programs become more self-directed and more confident as they move from beginning students to program graduates, thus a comparison of SDLR development over time between students in a traditional and a PBL medical programme would add to our understanding of the PBL-SDL relationship. Another limitation was the use of a self-report measure. Although the reliability of the SDLR developed by Fisher et al. (2001) measure was confirmed by our study, the validity of the measure has not been verified and all items were positively scored. Finally, the emphasis on SDL within PBL is purported to lead to lifelong learning, yet there is little empirical evidence to support this assertion. Follow-up study of graduates to assess the quality and quantity of their lifelong learning activities is needed.

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Table 1. Comparison of Students' Self-Directed Learning Readiness Subscale Mean Scores According to Program Year (n = 170)

Subscale	Mean score	F	<i>P</i> *
Self management			
Semester 1	47.31±5.53		
Semester 2	53.10±6.01		
Semester 3	55.66±5.13	32.41	0.0031*
Semester 4	58.54±3.86		
Semester 5	49.24±4.23		
Learning desire			
Semester 1	54.30±4.74		
Semester 2	53.68±5.10		
Semester 3	52.67±4.08	17.48	0.0018**
Semester 4	58.35±3.11		
Semester 5	57.70±4.41		
Self control			
Semester 1	$58.73{\pm}6.31$		
Semester 2	67.34±5.86		
Semester 3	65.45±6.33	24.31	0.0023**
Semester 4	68.98±5.31		
Semester 5	66.87±4.87		

* Significant difference at p value < 0.05; ** Significant difference at p value <0.01