Use of a Learner's Log for Effective Self-Directed Learning in PBL

Amudha Kadirvelu, and Sivalal Sadasivan

Abstract—While the problem based learning (PBL) approach promotes unsupervised self-directed learning (SDL), many students experience difficulty juggling the role of being an information recipient and information seeker. Logbooks have been used to assess trainee doctors but not in other areas. This study aimed to determine the effectiveness of logbook for assessing SDL during PBL sessions in first year medical students. The log book included a learning checklist and knowledge and skills components. Comparisons with the baseline assessment of student performance in PBL and that at semester end after logbook intervention showed significant improvements in student performance (31.5 ± 8 vs. 17.7 ± 4.4; $p<0.001$) with a large effect size of 3.93. The learner's log for PBL has played an important role in enhancing SDL in first year medical students. Learner's log could be a good self-assessment tool for the undergraduate medical students.

Keywords—Problem based learning, self-directed learning, logbook, self-assessment.

I. INTRODUCTION

MEDICAL students and other trainees in the health profession are increasingly being exposed to a variety of unsupervised learning contexts throughout their learning. Self-directed learning forms the backbone of medical curriculum in most medical schools around the world thus preparing their graduates to be lifelong learners. Current insights on learning emphasize that learning should be self-directed, constructive, collaborated and contextual process. Self-directed learning denotes that learners play a dynamic role in planning, monitoring and evaluating the learning process [1]. Planning involves the learner considering a variety of ways to approach a task, setting a clear goal, selecting strategies for achieving that goal and identifying potential obstacles to successful achievement of the goal. Monitoring implies that the learner is aware of what he or she is doing and forestalls what ought to be done next, by looking back and forth. Subsequently, evaluation of both the process and the product of the learning process take place. Reflection plays a vital role in the process of self-regulation [1]. Self-directed or lifelong learners plan, monitor and appraise their own learning and direct or regulate their own learning process. Motivation plays a significant role in promoting and sustaining self-regulated learning [2]. In addition, prior knowledge is an essential prerequisite for self-regulated learning because it is essential to plan a learning goal and monitor the learning process [3].

In short, self-directed learning requires the student to determine his learning needs, formulate learning goals, identify learning resources, select and employ adequate strategies, and evaluate learning outcomes. It prepares students for becoming lifelong learners who are able to rapidly acquire new knowledge and skills.

Independent self-directed learning is initiated early in the medical program through problem based learning (PBL). In PBL, students use triggers from the problem case or scenario to define their learning objectives. The learners evaluate and explore the problem, and identify what they already know, and what they need to find out further to solve the problem. Subsequently, they do independent, self-directed study before returning to the group to discuss and provide feedback to the other group members. They then synthesize all the information gained and collaboratively try to evaluate the gathered information to solve the problem as well as refine their acquired knowledge [4]. Thus, PBL supports students' self-directed learning, engages students in a professional learning context and fosters important principles of learning.

Self-directed learning is now frequently used interchangeably with PBL. Though SDL is consistent with several educational concepts and theories, it assumes that all learners display attributes of maturity, independence, self-direction, responsibility and individuality. To date, there is no standardized method to assess learners' readiness for SDL and there is paucity of evidence to document the efficacy of SDL compared with traditional didactic curriculum [5]. However, there are many studies reporting the challenges faced by first year medical students with the PBL based curricula. Many students appear to struggle with the process of PBL, juggling between the role of information recipient (in conventional learning) and information seeker (in PBL) [6]. Uncertainty about individual study behaviour, progress and aptitude were reported to be the main stress factors among first year medical students in Glasgow University Medical School [7]. Further, radical over-estimation of the level of learning has been described in medical students and residents [8-10] and these illusions of competence have been attributed to a student's misreading or misunderstanding of their progress during training [11].

Thus, while there may be a good reason to increase our reliance on unsupervised, self-guided learning for students in the non-clinical context, if we are not reflective and strategic in this shift we run the risk of developing superficial learners without adequate insight and depth into the matter. Though SDL may imply the lack of need for an educator, learners often need an expert to introduce them to the basics of SDL

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including the appraisal of educational needs, adoption of a theoretical context and development of learning goals [12].

During formal educational activities in which students guide their own learning, the environment should be structured with safeguards that direct students along the path of competence rather than the path of incompetence. Instead of assuming that the student will make effective learning decisions, interventions designed to take advantage of their natural propensities when learning on their own may be needed to direct their decision towards effective learning activities. An educator's use of learning theory to influence instructional design for unsupervised context is called directed self-guided learning [13] and is supported in various educational concepts like the zone of proximal development [14] and scaffolding [15]. It has been established that educators can diagnose the student's learning needs and focus their learning efforts more effectively [16, 17]. In addition, without informed corrective feedback, students may develop bad habits and come to incorrect judgments about their learning [18].

The transition from a traditional, didactic, educational background to self–guided learning is a challenge to most first year medical students. Learners in general are not used to having to carry out independent inquiry and problem solving and they start off "groping in the dark". It is not uncommon to see learners become extremely frustrated at the beginning when presented with an unstructured problem. Some find it extremely uncomfortable not knowing which areas to cover and to what extent, while some others may feel insecure about the extent of their research even if their research is comprehensive. Though learning objectives are provided to the students at the end of each PBL session, these learning objectives are dictated by the curriculum and often tend to be very broad. This may result in confusion and demotivation in some students, while superficial learners may develop a false sense of security, being content with the width and depth of their research. Thus, we run the risk of developing learners with knowledge, attitude and skills that conflict with the components of SDL. Based on the concept of directed self-guided learning, we postulated that the introduction of an educational intervention tool such as a learner's log for PBL can assist students to identify learning needs and appropriate resources, determine the required depth of research, identify the expected learning outcomes, and also, aid in overcoming their perceived sense of being at a loss, as well as reducing the stress associated with SDL among first year medical students.

A learner's log is the evidence of what a student has learned. It serves as a tool to track student experiences and to determine whether students have met the curricular objectives. Logbooks have been traditionally used in medical education to structure clinical clerkships for documenting, grading and evaluating undergraduate curricula [19]. However, little is known about the potential for log books to serve as a tool to bridge the gap between effective SDL and successful PBL implementation in first year medical students.

It is postulated that the introduction of an educational intervention tool such as a learner's log that guides the learners in the identification of learning needs and appropriate resources, required depth of research and expected learning outcomes can aid in reducing their perceived sense of loss and the stress associated with SDL among the first year medical students. It can also lead to better learning when trainees understand how to optimize training and tailor it to their unique needs. Trainee motivation may also increase when they are active and autonomous in their learning decisions. The log book could also promote reflective thinking, increase SDL skills and serve as a tool to self- monitor/evaluate their learning outcomes. We hypothesized that introduction of a learner's log for PBL can assist a self-directed learner in determining learning needs, formulate learning goals, identify learning resources, select and employ adequate strategies, and evaluate learning outcomes.

It could also lead to better learning when the learners understand how to optimize their training and tailor it to their unique needs. Learner motivation may also increase when they are active and autonomous in their learning decisions. The log book may also promote reflective thinking, increase SDL skills and serve as a tool to self- monitor/evaluate their learning outcomes. The purpose of this study was to determine if the use of a learner's log would: enhance the understanding of SDL concept; improve their level of readiness for the next PBL; enhance their knowledge and skills related to PBL and aid in achieving their learning objectives and outcomes.

II. METHODOLOGY

In this quasi-experimental study all first year medical students at the Monash University Sunway Campus were invited to participate. These students are introduced to the concept and process of PBL in their orientation week and continue to have their regular PBL sessions with the same tutor once a week during the entire semester/year. On the completion of three PBL weeks, individual student performance on specific PBL indicators was assessed by the group facilitators on a 5 point Likert scale (1-High to exceptional; 5-Unsatisfactory to low) that served as the baseline or 'before logbook intervention'.

After collection of individual baseline performance, PBL case specific log books were handed to each student at the end of their PBL session on alternate weeks (5, 7, 9 and 11). The books were delivered at the end of the PBL session and on alternate weeks so as to be less directive and to provide autonomy for their learning decisions. The log book was equipped with a learning checklist, learning resources, knowledge and skills component, and learning objectives and outcomes of the respective PBL case. Students were asked to reflect and record their realistic learning achievements against the expected outcomes and use it as a guide and monitor for their further SDL activities. At the end of the first semester (week 12), facilitators were again asked to complete the assessment of student participation/performance in PBL sessions to measure the effectiveness of the log book intervention.
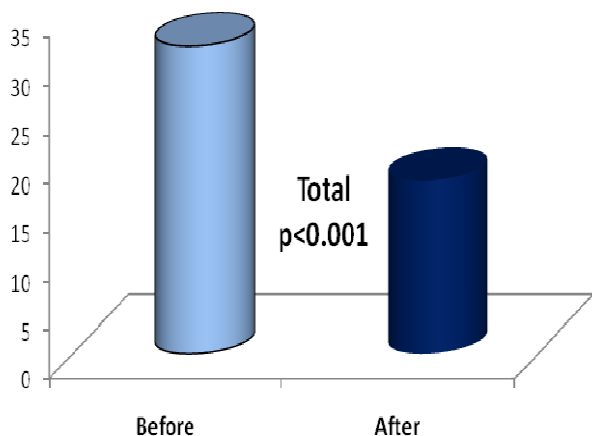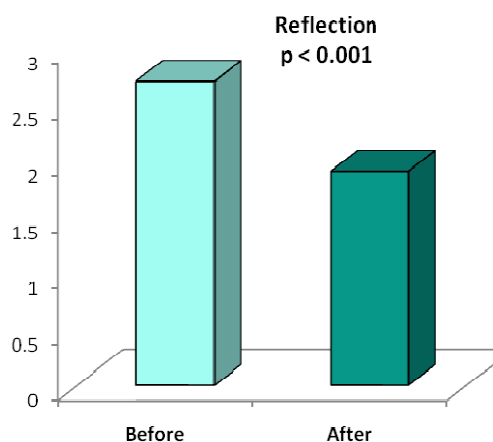
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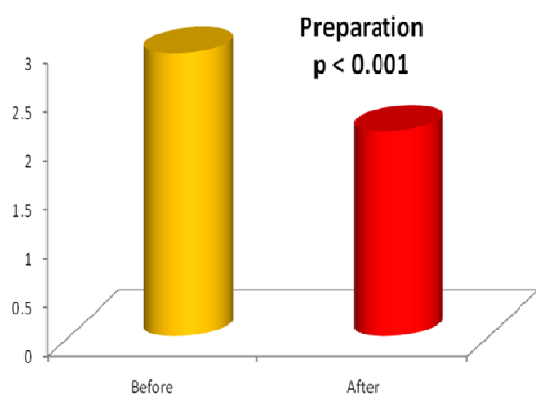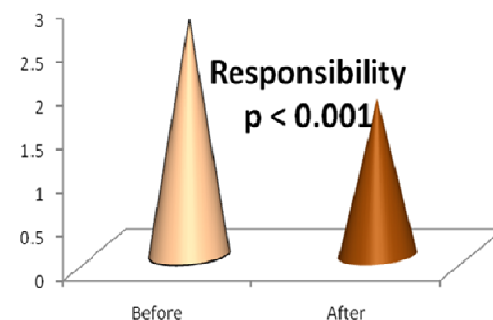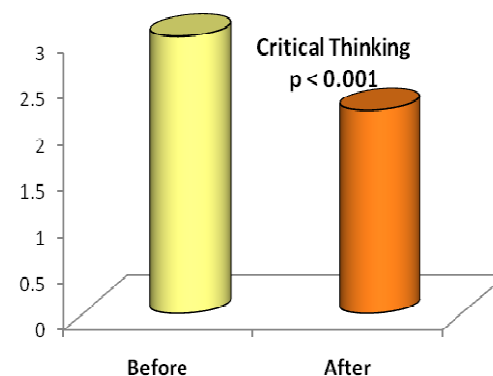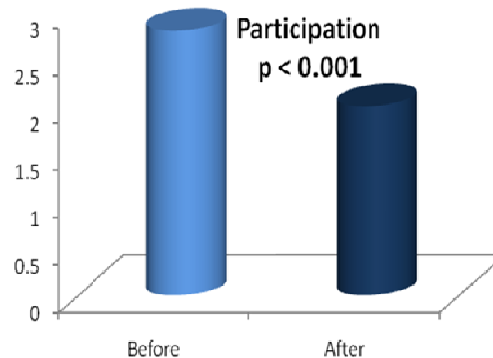Vol:7, No:1, 2013

Fig. 1 Difference in total score before and after logbook intervention
(1 - High to Exceptional Performance; 5 - Unsatisfactory to Low)

III. RESULTS

All the first year medical students (n=138) enthusiastically participated in the learner's log project. Assessment of student performance in PBL by facilitators between weeks four and five indicated that most students were rated in the range of 3 and 4 in all indicators (where 1 was high to exceptional performance and 5 was unsatisfactory to low). After implementing the learner's log for PBL, a significant improvement (p<0.001) was noted in all the measured indicators of effective self-directed learning. A clear shift towards the left with a rating of 1 and 2 (from 4 and 5) in the student performance was observed. Fig. 1 depicts the significant difference in the total score of student performances before and after (31.5 ± 8 vs 17.7 ± 4.4; p<0.001) the education tool intervention with a large effect size (Cohen's d value 3.93). The logbook has resulted in a major change in critical thinking, reflection of their learning and the teaching (Fig. 2) or knowledge sharing with the peers. These indicators are known to be the core of effective independent learning and by improving these parameters and other qualities as described in Fig. 2, the learner's log has clearly achieved its objectives.
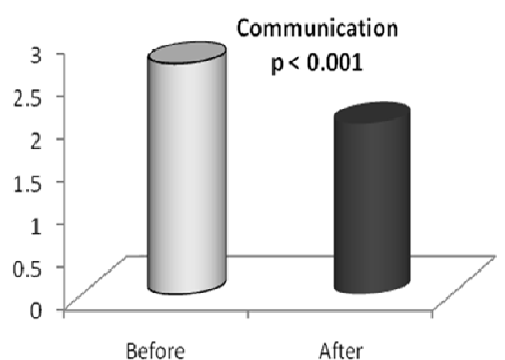
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Fig. 2 Difference in student performance before and after logbook intervention (1 - High to Exceptional Performance; 5 - Unsatisfactory to Low)

IV. DISCUSSION

The introduction of logbook was associated with a major change in critical thinking, reflection of their learning and knowledge sharing with the peers. Our students believed that the logbook was useful in in filling the knowledge gaps and guiding the depth and width of research required for effective PBL discussion. Besides it also helped them with better preparation for future PBL sessions. It is not clear whether the beneficial effects experienced by the students would be retained over long term and whether the logbook would have an impact in their theory and clinical assessment. Further studies on the impact of learner's log for PBL are warranted.

In conclusion, learner's log for PBL has played an important role in enhancing independent learning in first year medical students, and in reinforcing the role of self-directed learning.

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