UTILISATION OF DIFFERENT RESOURCES FOR SELF-DIRECTED LEARNING BY STUDENTS UNDERGOING AN INTEGRATED PROBLEM-BASED MEDICAL CURRICULUM

Mala Maung, Zoraini Wati Abas, Azman Abdullah

ABSTRACT

As the success of self-directed learning depends not only on the learner, but importantly, on the right balance of learning opportunities, utilisation of different resources for self- directed learning was assessed in students undergoing the medical programme at the International Medical University. Utilisation of each resource was correlated with the semesters, students' learning style and their pre-university education. Resources included printed materials, clinical skills (CSU), problem-based learning (PBL), communication with peers, communication with experts, library, museum, laboratory session, assigned independent reading (AIR), structured independent learning online system (SILOS), and online learning interactive system (OLIS). Of the 708 students assessed, 98% and 49% found printed materials and AIR useful for self-directed learning, respectively. While printed material was ranked highest, AIR was ranked lowest by students of all semesters. Only PBL, CSU and OLIS have positive correlation with semester. Utilisation of printed materials was scored highest and AIR lowest irrespective of whether learners were active/reflective, sensing/intuitive, visual/verbal or sequential/global. Students scored printed materials highest and AIR lowest regardless of their pre-university education. Utilisation of other resources was also addressed. Resources relevant to learners' need are highly appreciated and novel resources should ensure sustainability of learner interest and enthusiasm. The results also indicate that the learning environment is conducive for the development of independence and self-reliance in learners. These findings are invaluable in planning resources and if necessary in promoting relevant traits of self-directed learning, and should convey important feedback to learners as well as implementers to further enhance the learning process.

INTRODUCTION

Self-direction and self-directed learning (SDL) have been described by many (1, 2) and the resources which are required to achieve SDL identified (3). Self-directed learning is often linked to lifelong learning and an evidence-based approach to learning (4) Research on SDL have been based on three main themes namely descriptive evidence of planning

by learners, self-directed learning level in the learner and the qualitative methods to address self-direction in learning during adulthood (5).

As the success of self-directed learning does not depend only on the learner, but also to an important extent, on the provision of the right balance of learning opportunities, a survey to determine the utilisation of different resources as a means of self- directed learning, was conducted on students undergoing the medical sciences programme at the International Medical University. The International Medical University (IMU) has implemented an integrated, problem-based learning (PBL) medical curriculum since 1992, when its medical faculty was first founded. The resources which are provided to enhance the learning process, in addition to problem-based learning (PBL), include printed materials, library, clinical skills (CSU), communication with peers, communication with subject matter experts, museum, laboratory session, assigned independent reading (AIR), structured independent learning online system (SILOS) and online learning interactive system (OLIS). AIR, SILOS and OLIS are information technology and computer-assisted learning resources which are provided to compliment the effectiveness of a PBL curriculum (6).

The success of inculcating self-directed learning is dependent, to an important extent, upon provision of adequate learning opportunities. Thus, the variety of learning resources available at the International Medical University are aimed at providing opportunities for self-directed learning in individual or group activities. Nurturing self-directed learning is a delicate process as it may not be successful if learners lack independence and confidence, or if there is a lack in resources (7, 8). Although the implementation of innovative learning resources presents challenges, a continuously evolving learning environment is needed to ensure the continued delivery of high quality medical education in order to address the changing role of medicine and the expectations demanded of physicians.

MATERIALS AND METHODS

Study Population

The study population comprised students attending the phase 1 medical programme (Semesters 1 to 5) of the International Medical University. Participation was wholly voluntary and anonymous. The objectives of the study and the methodology were explained to all participants. The number of students who participated in the study comprised Semester 1, N=181 (92%); Semester 2, N=162 (93%); Semester 3, N=144 (96%), Semester 4, N= 122 (80%) and Semester 5, N= 99 (83%).

Survey

The questionnaire was designed to address particulars of students and the various aspects of SDL. Different researchers have used various measuring tools to elucidate the SDL readiness in and the SDL perception of, learners (2, 9). The questionnaire that was used in this study was constructed so that it would be easy to comprehend, and addressed

issues relating to characteristics of successful self-directed learners, process and benefits of SDL, and resources for SDL.

Innovative Resources

1 Assigned Independent Reading (AIR)

The AIR themes/topics were selected to reflect the learning sessions undertaken during the respective weeks for each semester. More emphasis is placed on the basic medical sciences. The topics are integrated in nature but may be also disciplined-based. A list of printed materials and websites were provided as references for the AIR. Two topics were identified for portfolio assessment pertaining to the AIR session for each course/system. Students undertake the assignments independently and submit the portfolios online.

2 Structured Independent Learning Online System (SILOS)

The Structured Independent Learning Online System (SILOS) is an application of the Virtual Medical University Project. The students utilise this online application to submit AIR portfolios and to participate in weekly formative, self-assessment sessions.

3 Online Learning Interactive System (OLIS)

The Online Learning Interactive System (OLIS) is a virtual learning environment formulated for each course/system. Relevant topics are identified for each system and an individual topic includes objectives, content, references and formative assessment.

RESULTS

Relationship between semester and utilisation of resources

Of the resources provided, on a ranking scale of 1 to 5, printed materials was ranked the highest (mean 4.40), and assigned independent reading (AIR), lowest (2.45) by students of all semesters. Although variations occur between the semesters, the overall usefulness of other resources, in descending order was, library (4.0), clinical skills (CSU) (3.9), communication with peers (3.8), communication with subject matter experts (3.7), museum (3.5), laboratory session (3.3), problem-based learning (PBL) (3.3), structured independent learning online system (SILOS) (3.2) and online learning interactive system (OLIS) (2.9) (Fig. 1). Although PBL, CSU and OLIS have positive correlation with semester, only the correlation between the PBL and semester is significant. The remaining resources have negative correlation with the semester and the correlation coefficient is significant for all except for communication with peers (Figs. 2 - 4).

Relationship between pre-U education and utilisation of resources

The types of pre-university education that the students had experienced were categorized into 3 main groups with other smaller numbers of various types grouped under others. The majority of the students underwent STPM (Malaysian equivalent of matriculation) (N= 110), South Australian matriculation (SAM) (N=152) and GCE : A-level (N= 247). The number of students who had other types of pre-university education was 188.

The utilization of the various resources available at the IMU in relation to the types of pre-university education is shown in Figure (5). Preference for the printed materials as a learning resource was scored highest (mean 4.40) and AIR lowest (2.47) irrespective of pre-university education. The preference, in decreasing value was CSU and library > communication with peers > communication with experts > museum > PBL > laboratory > SILOS > OLIS. The highest scores for utilization of printed materials, library and communication with experts were seen with the SAM students. STPM students scored the highest means for PBL communication with peers, SILOS and OLIS, while the GCE :A-level students scored museum, laboratory and AIR highest. However, the difference in mean was significant between the SAM and GCE: A-level students for the museum, AIR and printed materials.

Relationship between learning style and utilisation of resources

Generally, there were more reflective than active, more sensing than intuitive, more visual than verbal and more sequential than global learners. The mean values for the utilisation of resources in relation to the learning style are shown in Figures (6 – 9).

Correlation of learning style with choice of resources showed that printed materials scored highest (4.4) and AIR lowest (2.5), irrespective of the learning style.

Preference of individual resource for self-directed learning by active learners showed a significant higher mean for communication with experts and peers as compared to reflective learners. (Fig. 6)

Significantly higher means are seen for the museum and printed materials as useful self-directed learning resources with the sensing learners. (Fig. 7).

Visual learners scored significantly higher means for the museum, laboratory and OLIS. Interestingly, visual learners scored a higher mean for communication with experts whereas verbal learners scored a higher mean for printed materials. However they were not significant (Fig. 8).

Global learners rated significantly higher means for laboratory, communication with experts and communication with peers, compared to sequential learners (Fig. 9).

DISCUSSION

The learning resources which are provided at the IMU include problem-based learning (PBL), printed materials, library, museum, communication with peers, communication with subject matter experts, clinical skills (CSU), laboratory session, assigned independent reading (AIR), structured independent learning online system (SILOS) and online learning interactive system (OLIS). The provision of a varied mix of learning resources is to ensure that learners develop the ability to acquire knowledge, skills and attitudes related to self-directed learning through utilization of resources in the form of group activities or as activities for individual learning. Snell has stated that the importance of the right mix of group and individual learning activities to promote self-directed learning (4).

Learners in semester 1 scored high means for the museum, AIR and SILOS. The means gradually decline with the higher semesters. It is perceived that the students have not been exposed to these resources, especially the AIR and SILOS, and thus constitute novel means of learning. The learners may be exhibiting the "honeymoon effect" of a training programme, whereby when experiencing the learning environment for the first time, the learners are full of enthusiasm and expectancy, which after some period of time, the novelty wears off and enthusiasm declines (10). This may also be evident from the results seen with the utilisation of library, communication with peers, communication with subject matter experts and printed materials as resources for self-directed learning which remained relatively constant throughout semesters 1 to 5. Printed materials as a learning resource was scored highest by learners irrespective of semester, learning style or pre-university education. This may reflect the learning method to which the learners have been exposed to prior to their admission to the university environ and the comfort and ease of adaptation towards the resource the learners are used to. These resources may be more "traditional" means of learning and may explain the relative plateau seen with them. This indicates that it is essential to plan, implement and review the resources or mode of delivery in order to sustain the continued interest and enthusiasm of learners.

Resources relevant to the learners' needs are scored high as is seen with the utilisation of laboratory by semester 1 and 2 students. These two semesters have laboratory sessions which are relevant to lectures and other learning activities and thus complement and reinforce the learning process. This is an important feedback to the implementers for the need to plan and conduct relevant laboratory sessions, as appropriate, for other semesters. The utilisation of CSU as learning resource is another example of the importance of relevance and the application of theory to practice in maintaining and promoting motivation in students and for enhancing appreciation of the resource.

Appreciation of PBL as a resource for self-directed learning by the learners increased with advancing semesters. This may be due to the increasing maturity, further

development of confidence and independence, appreciation of the relevance to real-life situations and acquisition of enhanced interpersonal and communication skills. Steinert has stated that the ability to work as a team and learn from other learners rather than from educators and the appreciation of relevance of content to clinical situations enhance the success of PBL as a resource for self-directed learning (11). PBL as a resource for self-directed learning fosters positive traits, such as responsibility to self and others, the ability to work as a member of a team and as an individual, emotional and social maturity, and communication and interpersonal skills (12). As the learners mature, these positive traits would have contributed towards the development of adult learning skills, whereby they are able to assess and appreciate their acquisition of knowledge and skills in relation to other learners (13).

AIR was perceived by some as rigid and that the online submission of portfolios time consuming as the network was, at times not user friendly. However the majority agreed that the topics were useful in providing added information. It may be more receptive if the learners are given a framework of topics based on a particular theme from within which the learners choose. This may motivate them as they are involved in making their own decision in choosing a learning topic (14). Submission of portfolios relating to AIR is a requisite and its aim is to guide students towards reflecting on what has been learnt and to enable them to summarise and evaluate the information and knowledge acquired in relation to the outcomes of the IMU. This is to enable students to develop decision making, critical thinking and self-reflecting skills, and the ability to use these traits on their own.

SILOS is a learning resource aimed at promoting the habit of inquiring and self-reflection. It permits self-assessment and serve as a monitoring system for the learner to evaluate oneself and to reinforce the areas of need or deficiency. SILOS assessment and the submission of portfolio also serve as a monitoring system for the educators. Monitoring of the utilization of resources is invaluable as without some type of monitoring, learners' commitment to the learning resources may not be regular (15). In addition, there may be a need to increase learners' awareness that AIR, SILOS and OLIS are information technology and computer-assisted learning resources which have been provided to enhance the effectiveness of a PBL curriculum as stated by Jones et al (6), and that acquisition of IT skills will reinforce their information searching, gathering and retrieval skills (4). Moreover, learners may be more motivated and committed if they are made aware that they play a crucial role in contributing towards the development of their learning environment through their feedback (16)

It can be seen that the learners became increasingly self-reliant and independent of subject experts as they progress through the semesters. These traits may be due to the developing maturity of learners and the acquisition of lived experiences which may be attributable to the influences of the learning environment to which they have been exposed.

The formal learning environment is crucial for nurturing self-directed learning as self-direction develops in stages and implementers should ensure that the environ is relevant and supportive in relation to the individual stages (17). In addition to the formal learning activities, the family background and cultural factors of the learner should also be taken

into consideration when interpreting the success or failure of self-directed learning, as these can influence to an important extent, the motivation and commitent of learners. Das Carlo et al stated that the students' background might influence motivational and cognitive factors that can determine the outcome of group-learning (12). In agreement to this, is the statement that certain family attitudes and practices may be created to encourage self-directed learning. Encouragement and support of self-directed activity, discussions, and creation of a rich home learning environment are some of the techniques mentioned (18).

CONCLUSION

This study highlighted the importance of providing a variety of learning resources for the development of self-direction, independence and self-reliance in learners and for the acquisition of self-directed leaning skills. Learners exhibited positive traits of enthusiasm and motivation as they enter the university learning environ. These traits were also seen when they were undertaking novel learning methods. Thus implementers must be aware that it is imperative that the learning environment and the resources are supportive to sustain and further enhance these positive traits. It is equally important to bear in mind that resources which are relevant to the learner's need, which have practical applications and which can be related to clinical experiences are highly appreciated for self-directed learning.

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