Hybrid PBL – Hub format an innovative design for effective small group learning

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Abstract

Designing effective small group learning can be a challenge for any institution involved in higher education. Problem Based Learning (PBL) has been in existence as an innovative and student centred learning method for the past five decades. From its simple origin at McMaster University, Canada, PBL has spread across the globe and its complexity has also evolved as a learning system. Due to limitations in resources, many Medical and Health Professional schools have incorporated PBL with other didactic teacher centred learning modalities. This is known as the hybrid curricula model. However, the hybrid model sometimes creates unwarranted competition between PBL and other modalities of teaching, leading to ineffective learning and tutor dissatisfaction. Using the hybrid PBL model to contextualize and integrate subject matter learnt through didactic and teacher led teaching learning modalities could circumvent these limitations. This is known as the "Hub format" of the hybrid model. The Hub format while allowing integration of content matter, allows the learner to discover relevant new knowledge for future learning and practice. It also facilitates the teachers to align student assessment to their learning, leading to improved student engagement in PBL and their motivation for learning.

Key Words: Problem Based Learning, student directed learning, learning system design

Introduction

Problem Based Learning (PBL) has been advocated and championed in higher education across the globe for more than four decades, after its simple beginnings at McMaster University, Canada (Finucane *et al.*, 1998; Barrows, 1996; Boud & Feletti, 1997).

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PBL method was seen by many teachers, administrators and policy/curriculum planners "…*as a radical, innovative, and an alternative pathway to learning in Medical Education thus setting a new educational trend."* (Gwee, 2009). After a slow and cautious beginning, PBL method began to be accepted and adopted by medical and health professional (MHP) schools during mid 70s and early 80s.

The second wave of PBL swept through MHP schools in the 1990s. This was also facilitated in some countries by authorities responsible for funding or maintaining standards in higher education directing their institutions overtly or otherwise to adopt the PBL method (Lam & Wan, 2006; Carnegie Foundation, 1998; Camp, 1996; General Medical Council, 1993; Albanese & Mitchell, 1993).

Advantages of PBL during student learning have been researched and documented in contemporary literature. After a systematic review of PBL literature, Koh and colleagues (2008) reported the positive effects of PBL on physician competency especially in social and cognitive dimensions. This has been further validated by a study in Germany where the

authors reported that PBL graduates demonstrated preferred attributes for employment by healthcare institutes (Schlett *et al.*, 2010). It is also reported that students from PBL curricula enjoy their learning experiences and that they develop important domain independent skills such as communication, leadership, team-working, professionalism, researching etc. which are essential for future practice. (Prince *et al.*, 2005; Khoo, 2003; Gwee & Tan, 2001; Seneviratne *et al.*, 2001; Cockrell *et al.*, 2000; Albanese & Mitchell, 1993; Vernon & Blake, 1993; Blake & Michael, 1992). PBL has also been shown to reduce student dropout rates from medical schools (Iputo & Kurzera, 2005). Studies in dental education have shown that students from PBL curricula attain higher level of achievement in US National Dental Board Part 1 examinations than students from traditional curricula (Fincham & Shuler, 2001). It has also been shown that students learning in PBL curricula score higher in exams if the assessment items are clinically based (Vernon & Blake, 1993). A recent study in dental education has also reported that students from a PBL background demonstrate higher skills in applying basic science principles to clinical vignettes compared to students from more conventional curricula (Callis *et al.*, 2010).

PBL is not without its own limitations. The biggest issues are resource intensive processes, difficulties in tutor training as well as retaining them, dysfunctional student groups, superficial learning and perceived lack of knowledge by PBL graduates (Gwee, 2009; Ferguson, 2005; Houlden *et al.*,2001; Boud & Feletti, 1997; Barrows, 1996; Camp, 1996).

What is PBL and what is not PBL

With its wide acceptance in MHP schools, PBL is interpreted and conducted in many different ways (Gwee, 2009; Maudsley, 1999; Lloyd-Jones *et al.*, 1998; Charlin *et al.*, 1998; Alavi & Margetson, 1997). This has led to difficulties in identifying the issues relating to curriculum design, operationalizing PBL, effective resourcing and evaluating outcomes. Therefore, the authors wish to establish a few essential features of PBL and identify non-PBL teaching-learning situations.

The essence of PBL is that learning begins with a problem (Gwee, 2009; Finucane *et al.*, 1998; Boud & Feletti, 1997; Barrows, 1996; Camp, 1996; Alavi, 1995). However, PBL is not directed at solving the given problem or the case but learning from it. As the student cohort matures there will be more problem solving than learning (Boud & Feletti, 1997; Norman & Schmidt 1992).

The second core feature in PBL is that it is a student centred activity. The students identify their learning needs after engaging in inquiry based discussions. They will discuss in small groups what they already know regarding the problem and identify areas for further study. Active engagement in the learning process through discussion pedagogy allows the students to activate their prior knowledge, clear misconceptions and align the learning process to the problem (Gwee, 2009; Finucane *et al.*, 1998; Boud & Feletti, 1997; Barrows, 1996; Norman & Schmidt 1992). This also allows the students to take responsibility for their learning and take the initiative in their education (Gwee, 2009; Finucane *et al.*, 1998; Shin *et al.*, 1993).For this second core feature to effectively take place teachers involved in medical and health professional PBL programmes should realign themselves from being teachers to facilitators of learning. The moment teachers take the central role as the information provider - “sage in the centre stage” mindset, converting the student discussion into mini lectures, the learning modality changes from PBL to a conventional teacher centric modality (Albanese, 2004; Houlden *et al.*,2001; Koschmann *et al.*,2000; Finucane *et al.*, 1998;). Student centric active learning is the third core feature of PBL.

The next essential feature PBL is the student group. The student group needs to be manageable and small for active discussions to take place and to facilitate student and group assessment by the tutors. The ideal PBL tutorial group size is five to seven students (Kelson, 2000). When the PBL tutorial group grows beyond eight students, the team dynamics suffer and providing proper tutor support becomes very challenging. Therefore, the fourth core feature of proper PBL is the small group size and when this is compromised, the learning is not PBL.

PBL in a busy curriculum

Curriculum developers and teachers involved in MHP programmes should pause and reflect on the reason/s to incorporate PBL into the curriculum or teaching programme. To answer this, one must see the value of PBL in their learning environment. PBL is described as a learning system design by Gwee (2009). This emphasises that PBL should be incorporated meaningfully to the curriculum taking into

account the pedagogical principles of student centred learning, rather than using it simply as a content delivery tool by slotting in few PBL tutorial sessions among other teaching-learning activities.

PBL has been incorporated into MHP curricula in two broad ways. The first format can be described as the pure, authentic or pedigree model. In this model the entire curriculum content is delivered and learnt through, small group PBL style. Clear examples of this format are McMaster and Maastricht medical schools (Gwee, 2009; Boud & Feletti, 1997; Neufeld & Barrows, 1974). The second format is the hybrid model. The hybrid model employs different teaching-learning tools to deliver the content and uses PBL as one of these (Barrow *et al.*, 2010; Gwee, 2009; Khoo, 2003; Gwee & Tan, 2001; Boud & Feletti, 1997). The hybrid model is popular among MHP schools across the globe. The underlying assumption is that hybrid PBL model is easier to incorporate and implement into a curriculum with the available or minimal addition to teaching-learning resources. Here lies the problem that creates critical challenges to the learners, teachers and administrators of MHP schools.

PBL as a hybrid model (h-PBL)

The value of using PBL must be very clear especially in a hybrid PBL model. The critical question when designing the learning system is whether to use PBL sessions as a "series" or as a "hub".

The series format is used when PBL sessions are employed to learn new content/subject matter and then to integrate and contextualize these new learning along with other teaching-learning modalities (Figure 1). The hub format is used mainly to integrate and contextualize content learnt through other teaching-learning modalities and in the process to discover new knowledge (Figure 2).

Figure 1: PBL in series

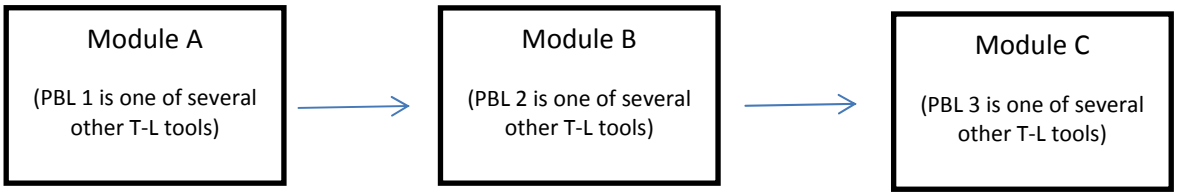
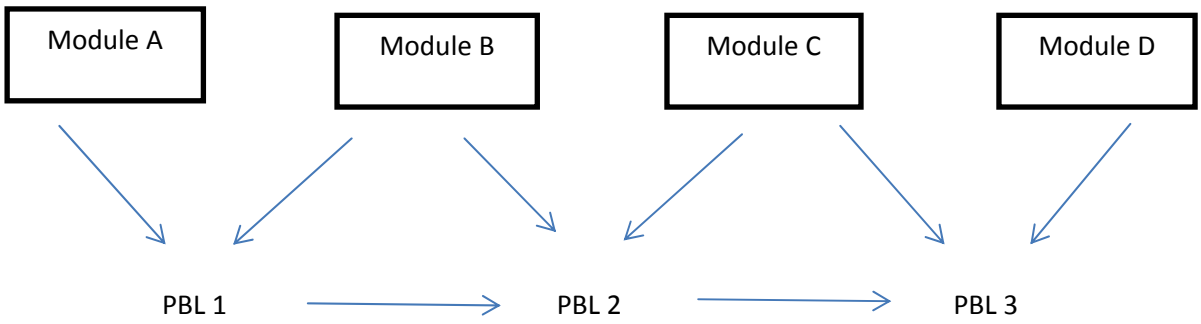


Figure 2: PBL as a hub



Incorporating the hybrid model could pose a challenge in many MHP curricula. The main reason is that PBL being a student centric learning model needs to compete with teacher centric conventional teaching such as traditional lectures, teacher led tutorials and case based learning sessions. When students have competing content delivery modalities, the curriculum must ensure adequate space and alignment to accommodate both methods. The students and their learning will suffer if the time tables are packed with activities and the assessments are based mostly on recall of content learnt rather than higher order cognitive functions such as application, integration and synthesis of knowledge as

classified by Bloom and others (1956). The series format of hybrid PBL model can suffer the most from these limitations which can lead to student dissatisfaction with PBL methods over didactic teaching modalities. When the time-table is packed with teacher-led activities and when the PBL session is slotted in together with such activities, the students need to switch their learning from a teacher led to student driven environment in quick succession. This could pose a huge challenge and create frustration among learners as the systems compete with each other for learning new subject/content matter. Often the PBL suffers.

The hybrid PBL (h-PBL): Hub format (h^2-PBL)

The h^2-PBL format offers a unique opportunity for both the teachers and curriculum designers to use conventional teacher driven teaching-learning and student led PBL methods synergistically without losing each of their unique advantages. The main difference of h^2-PBL to both pedigree and series formats is the cases/problems used are mainly to contextualize and integrate content delivered through other teaching-learning modalities. Applying this process, the students will discover new knowledge relevant to their future learning and practice. Using h^2-PBL will change the two learning environments of teacher led and student driven from competing with each other to value added learning for students.

h^2-PBL: Curriculum design

One of the key reasons for the failure of h-PBL formats is increasing popularity of problem based learning. This has led to educational policy planners to "enforce" MHP schools to incorporate PBL without much attention to the overall design. Failure to properly reflect on the "why" question as discussed earlier and focusing only on *what* should be taught and *how* the PBL tutorials should be slotted in the curriculum has led to many challenges.

This is compounded by lack or limited availability of resources such as trained PBL tutors, rooms for small group sessions and discussion areas for students, library and other IT resource facilities. Crowded timetables have also added to the severe limitations in students' learning through PBLs (Gwee, 2009; Ferguson, 2005; Houlden *et al.*,2001; Finucane *et al.*, 1998). Proper curricular planning is essential for the success of h^2-PBL.

The initial step in planning the curriculum to incorporate h^2-PBL is to identify key transition points for students to meaningfully integrate and contextualize their knowledge, skills and attitudes learnt through other teaching modalities (Callis *et al.*, 2010; Barrow *et al.*,2010). The other teaching learning modalities could be didactic lectures, tutor centric tutorials, bed-side teaching, self-study and/ or prior learning from past modules/ phases of curriculum. The problems/cases used in h^2-PBL must be developed based on the above concept, linking knowledge gained through prior learning experiences and allowing the learner to explore and discover relevant new knowledge and competencies for their future learning and practice. Therefore, the problems/cases used must be pitched at the correct level of difficulty and need to arouse the curiosity and interest of the learners.

The next crucial step in planning is to properly sequence the h^2-PBL tutorials in the time-table. When there is limited curricular time and resources, the above step would facilitate students to use basic foundational knowledge acquired through other planned teaching-learning activities to engage in an effective discussion during the first PBL tutorial session. It would further assist them to identify the right resource materials for further learning and develop appropriate learning objectives for their second session of the tutorial.

The success of hub format depends on identifying the key transition points, developing appropriate problems/cases and aligning timetable slots with other teaching activities. Failure to do these will lead to ineffective student learning which can frustrate the learner as well as the teachers.

The final step in the curriculum design is planning the module or phase (year) assessment and evaluation. This will be discussed as a separate section in this paper.

h^2-PBL: Learning environment

The learning environment depends on four main factors: the student group, the tutor/ facilitator, the problem/case and the facilities available for effective learning. We have discussed the importance of the problem/case in the earlier section.

The student group: The significance of positive group dynamics for active learning during a PBL tutorial has been discussed by many authors (Gwee, 2009; Finucane *et al.*, 1998; Boud & Feletti, 1997; Barrows, 1996;

Camp, 1996; Blake & Michael, 1992; Norman & Schmidt 1992). MHP schools need to train and inform students in both the PBL method and h^2-PBL format for them to develop the right attributes of active engaged learning. This should not be a onetime affair but repeated training, especially when students move from one phase (year) of learning to the next. Repeated training must also educate PBL learners to counteract underestimation of the competencies acquired through hub-PBL sessions. This would not only improve their learning during the tutorial sessions but also improve their confidence and trust in h^2-PBL method.

The tutor/facilitator: Faculty development in areas such as PBL method, effective PBL facilitation skills, student empowerment and student assessment during a PBL session is important and have been documented (Gwee, 2009; Boud & Feletti, 1997). Furthermore, tutors need to be informed of how the h^2-PBL sessions fit into achieving the overall curricular outcomes. This would assist the tutors to focus on facilitating student learning during the tutorial sessions and to contextualize and integrate content learnt to the problem/case. It would also deemphasise the debate on the values of teacher led and student centric modalities and allow both camps of teachers to focus on achieving expected overall curricular learning outcomes. Teacher centred approach during the tutorial sessions by some facilitators who are strong proponents of lectures and other didactic approaches and often viewed by students as aggressive behaviour would also be minimal and manageable as these teachers would not feel that PBL is "replacing" their forte. This is important in a resource limited curriculum where one needs to employ both camps of teachers to drive learning activities. Training the teachers to be better facilitators and reassuring them that h^2-PBL format will only augment the other teaching-learning activities will help to develop a safe and supportive learning environment for students.

The learning facilities: Having the right physical facilities to support PBL learning is important. Appropriate small group tutorial rooms, adequately resourced library including e-learning resources, internet and IT access are few of these areas. However, equally important is the development of a conducive learning environment by allowing students to meet, discuss and plan their activities by creating student learning spaces. These should be incorporated into common places where students meet – canteens, school outdoor parks, special library areas for discussions and allow the use of school auditoriums/small group rooms after office hours.

Creating a safe learning environment for students will be based on proper management of all the above mentioned factors.

h^2-PBL: Assessment and evaluation

Intelligent alignment of assessment to learning will motivate students to learn. One of the biggest challenges hybrid PBL models face is non-alignment of student assessment to the PBL style of learning (Nendaz & Tekian 1999; Boud & Feletti, 1997). Module assessments focus mainly on content matter from teacher centred modalities and assessment items are mostly based at lower order cognitive levels of knowledge (Bloom *et al.,* 1956). This frustrates hybrid PBL learners, who question the "value" of time they spend during PBL activities. However, by developing an assessment blueprint aligning both the learning content and the cognitive level of questions can somewhat circumvent this problem.

An additional advantage of h^2-PBL format is the learning content is based mostly on prior teaching-learning modalities. Since learning is not new content matter and is not arranged in a series, the hub format allows learners to integrate and contextualize the content material learnt. This allows taking their learning to the higher cognitive levels of application, evaluation/analysis and synthesis of new knowledge (Patel *et al.*, 2005). Teachers involved in developing assessment see the value add in incorporating assessment items aligned to h^2-PBL learning and the students see the relevance of being actively engaged in h^2-PBL learning sessions for immediate passing of exams as well as future learning or practice. This would also allow teachers to identify few students or groups of students who have gone beyond the required boundaries of learning for a given module/phase/year and have done extra or acquired/created new knowledge.

The success of the h^2-PBL format also depends on how the tutor evaluates each student and the group. Providing constructive feedback on group and individual student performance is vital for the success of this format. As discussed earlier, if the student group grows beyond eight, provision of useful feedback becomes a major challenge.

The next crucial step is evaluating h^2-PBL format. The students need to provide feedback to the tutor on his/her effectiveness as well as the usefulness of the case (Gwee, 2009; Boud & Feletti, 1997; Albanese & Mitchell, 1993). Regular monitoring of h^2-PBL sessions through Kirkpatrick level 1 and 2 evaluation is important and will provide useful information on whether the PBL sessions are aligned with the overall programme outcomes (Kirkpatrick & Kirkpatrick, 2006). This programme evaluation data should be fed back to course designers, tutors and students to close the feedback loop and inform the effectiveness of hub PBL format. Longitudinal follow-up and evaluation using Kirkpatrick level 3 studies is important and needs to be properly planned to provide data on the model's usefulness in developing student competencies for future learning and practice. Provision of feedback especially to the tutors needs to be moderated as some studies have found constant evaluation of tutor performance could lead to confusion and mistrust by PBL tutors (Papinczak, 2010).

Challenges and limitations to Hybrid PBL-Hub (h^2-PBL) format

Most of the main challenges and limitations have been discussed in detail in the relevant sections above. In summary, failure to take into account how h^2-PBL sessions would augment other teaching-learning activities, failure to allocate adequate time in the timetable for student centred activities, nonalignment of h^2-PBL learning with assessment, *ad hoc* faculty and student training in PBL methods, failure to evaluate the processes and provide feedback to both the students on their learning progress and to the teachers on their PBL tutoring could be documented as the main limitations. These limitations could result in breakdown of continuity of learning and the ability of the learners to contextualize and integrate their learning.

Conclusion

The hub format of the hybrid PBL model discussed in this paper offers curriculum designers and programme coordinators a conceptual framework to intelligently incorporate PBL. The format also uses both teacher as well as student centred teaching learning processes, synergistically leading to improved student satisfaction, achievement of learning outcomes and increased teacher engagement in curriculum implementation.

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