

The Influence of Problem Based Learning (PBL) in Undergraduate Medical Education on Surgical Trainee's Post-Graduate Education

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Abstract

Undergraduate education and post graduate assessment of junior doctors has changed considerably over the last 20 years. Having progressed from a student to a teacher in general surgery I have questioned previous methods of learning and wonder whether our trainees are now better equipped to take ownership for their undergraduate and post graduate education, and can link their techniques learnt from undergraduate training to the appraisals they face as doctors.

Keywords Problem-based Learning; Surgery

Practice Points

- Problem-based Learning (PBL) continues to be an excellent way of producing motivated, self-directed learners
- Students develop transferable skills such as team-working and communication
- PBL is comparable to post-graduate Procedure Based Assessments (PBAs)
- Self-reflection is imperative in both undergraduate and post graduate education.
- The clinical supervisor must understand previous learning methods when assessing junior doctors.

Introduction

When I was a medical student in 1999, Problem-based Learning (PBL) was in its infancy in the UK, and my medical school was one of the first to adopt it as a teaching strategy. During my undergraduate career I felt I had autonomy for my own learning and thus was further motivated to study. However, as a surgical registrar I am now involved in teaching undergraduates and surgical trainees who have followed a PBL curriculum, and am concerned by some of the apparent deficits in their knowledge. This therefore made me analyse my previous beliefs of PBL, ask whether this type of study is appropriate as a basis for a successful surgical career, and consider how I could continue to support trainees emerging from medical school that have learnt via PBL.

What is Problem-based Learning?

PBL is an educational technique originally applied to medicine in the 1960s by Howard Barrows at the McMaster University medical school in Ontario, [1]. It involves the description of a problem, or in medical education, a "case", which is discussed by a group of students who decide upon a variety of learning objectives having brainstormed ideas based on their prior knowledge on the pertinent subjects. The learning objectives set may include basic sciences, differential

diagnoses and management plans, as well as social issues for the patients. The students then would study throughout the week, and reconvene to discuss what they have learnt. Barrows described this as "the learning that results from the process of working towards the understanding of a resolution of a problem. In the beginning, problem will be encountered first in case of learning process" [2].

PBL has the aim of promoting independent and reflective knowledge building, by a guided experience of problem solving [3]. It therefore aims to provide a motivation for self-directed learning, and can allow students to develop an adaptable knowledge base which can be applied in various circumstances in the future.

The only bounds to the objectives set in a PBL session are the students' imagination and the direction from which they approach the "problem". I think this form of education is quite liberating to students, and, as argued by Bransford et al. [4], this active participation in learning can aid retention and recall more than a more traditional, didactic course, which is obviously a hugely desirable outcome for any future doctors.

Students can add a multitude of objectives if they feel they can complete the work in the allocated timeframe. However, this unbounded curriculum is daunting to some individuals. Therefore, each PBL session is overseen by a trained facilitator whose role it is to ensure the objectives are relevant and the discussions appropriate for the curriculum/guidance notes the facilitator has been given. As defined by McCrorie (2010) [5], the role of the facilitator is that of giving direction and encouragement. They should ensure students fulfill objectives to satisfy the curriculum without encroaching on the session being student lead [6]. The facilitator is known as a 'tutor', and these two terms should be thought of synonymously with regards to their role as defined above and not as per the classical definition of tutor from the Oxford English Dictionary which is that of a teacher first and supervisor second. The tutor is also allowed to take a "Laissez-Faire" leadership role [7] as they do not necessarily interfere with the process, but allow the group to come to their own conclusions. As discussed by Hmelo-Silver [3] the tutor's role is to "guide the learning process through open-ended questions". However, I feel this definition is too didactic, as, if the students are making good

progress without guidance, it may be more appropriate for the tutor to remain silent. That said, Hmelo-Silver also adds that the tutor should help to “get students to make their thinking visible and to keep students involved in the group process,” which I believe is a vital part to their role.

What has been learnt from PBL?

In my opinion, the primary strength of PBL is that it is group-based, student lead education. The students are allowed to establish what they already know and proceed from there, the importance of which was highlighted to us by Ausubel [8]. Not only does this empower students to take charge of their own education but allows them to feel they have a role in their curriculum design which will further motivate them to learn [9]. Also by sharing responsibility for their learning and developing understanding as part of a community, what they cover will be more memorable [10].

This form of case based study is universally adaptable to any subject matter, thus meaning that a breadth of curriculum can be addressed. The medical undergraduate curriculum is so broad-ranging that, as we know that students are more likely to retain what is relevant to them [11] by delivering the curriculum objectives encased in a clinical scenario, it makes the subject matter more tangibly relevant. As a method of delivering a curriculum, I think PBL is very effective and introducing new topics into the curriculum would also be simple. However, the breadth of knowledge students can develop from PBL methods means that curriculum design must be strict to ensure the essential subjects are covered at depth and the less core parts are not the focus of an entire session. This outcome is the responsibility of the course designers and group tutor, who must be disciplined and creative enough to ensure each ‘scenario’, covers an essential element of the curriculum. The paper from Malik and Malik [12] which addresses curriculum design as a whole concept can be extrapolated specifically to the PBL process. For example, training the facilitator to understand their role can be viewed as tip one, and determining their level of integration tips 2 and 3. Tips 4-9 can be adapted in their entirety to PBL, as the establishment of group work, outcomes, objectives, themes and timetables for activity are imperative to having a successful PBL group, as well as curriculum.

Neville [13] told us that PBL students can develop other traits thought to be superior to their traditionally educated counterparts aside from knowledge alone [13]. My own experience of this comparison is limited, but being involved in PBL is said to enhance team-working and communication skills, self-directed learning techniques, as well as students developing roles of leadership. As defined by Northouse [14] leadership is “a process whereby an individual influences a group of individuals to achieve a common goal”. I think this is incredibly relevant in the PBL situation, and an important form of developing as an independent scholar. The group concept of community learning allows each student to take the lead in fulfilling an objective, and although these acts of leadership may be fleeting, they wholly embrace Northouse’s definition. This is also mirrored in the NHS institute for innovation and improvement’ document [15] which states that, in medical leadership there is a shared sense of responsibility for the success of the organization and its services. Therefore, the students in the organization – in this case the PBL group - are being allowed to develop leadership traits that they can use in postgraduate careers and professional life.

It has been suggested that PBL combines basic sciences and clinical relevance at an earlier stage which stimulates deeper understandings of biomedical principles [16]. Although I agree that the introduction of both aspects to learning are present from the outset of PBL education, I feel there are vast gaps in the knowledge of undergraduates from this type of course, myself included. Instead I feel that Dochy’s statement that PBL had a negative effect on knowledge acquisition, but that clinical application of the knowledge gained was better, is more representative of my experience [17]. My impression was not supported by the findings in a Koh’s study [18], who found no significant difference in knowledge base from graduates of either course. However, it may be argued that PBL students have an increased awareness of their knowledge deficits, as one of the desirable outcomes of a PBL course is that the students develop as self-directed learners [19,20].

In the PBL setting, the majority of anatomy is learnt from a textbook. The facility was present for students to study pre-prepared cadavers, but due to the time constraints of the PBL program, the process of cadaveric dissection was removed from the syllabus. This is a significant omission, especially to surgical trainees, as my personal understanding of anatomy was predominantly based on anatomical drawing. Only as a post-graduate in theatre did I appreciate the paucity of my anatomical knowledge. The teaching of anatomy in this fashion remains controversial [21], and the most appropriate method to address this educational deficit is still under discussion. However, my personal impression of poor basic science retention amongst PBL students is not supported by some of the literature. A Paper by Chang et al. [22] showed that the examination results from traditional courses were not significantly different from those on PBL courses, and Prince et al. [23] reported no drop in perceived anatomical knowledge compared to more traditional courses. Professionally, I have been aware of unfavorable comparisons between PBL and traditional graduates that disagrees with these literary examples, and this anecdotal finding was supported by a trial conducted in Manchester which found a statistically significant difference between the anatomical knowledge of students of a traditional course, and that of a PBL course [24].

How can we Support PBL Students as Surgical Trainees?

With the apparent disparities in knowledge highlighted between literature based evidence and personal experience of PBL graduates, one must be mindful of evaluating the trainees’ current practice and addressing their ongoing learning needs. In contrast to their undergraduate studies, the curriculum for surgical trainees of all levels is clearly described in the Intercollegiate Surgical Curriculum Programme (ISCP) website [25,26]. When supporting surgical trainees, I believe it is important not to focus solely on operative skills address deficits in background knowledge, including anatomy, physiology and understanding pathological processes. Staying abreast of their educational needs is imperative as both their supervisor and educational lead.

When the leadership role of a head teacher in school was considered [25] it was highlighted that “the more adept [the head teacher] became at solving problems, the weaker the school became”. When extrapolated to consider PBL students, I think PBL may be more appropriate as a teaching method for more junior students, as they may be more interdependent for their ideas, and also may be able to set a better breadth of objectives compared to a more “adept”

problem-solver who might only see the 'solution'. However, it is imperative as lead in post-graduate (and undergraduate) education that we encourage all students to convert the skills they have learnt from PBL to the problem-solving exercises they face with each clinical case as a doctor. For example, the washback effect [27] describes the difficulty students' face translating their knowledge learnt to pass examinations to clinical scenarios. To aid this transition as a postgraduate trainer, I think it is important to first recognize the problem in hand, and support the doctors during the early stages of their career. Time pressures placed on junior doctors (often by themselves) to diagnose and treat when faced with complicated scenarios can cloud inexperienced doctors' judgment and make a situation appear overwhelming. The role of the supervisor can be to encourage the junior to take the situation back to first principles, breaking the case down to its salient points, and addressing each more manageable chunk. This form of leadership and guidance may well aid the doctor to be more focused and decisive whilst enabling them to transfer principles they have learnt in the classroom to the ward.

Knowing a self-directed approach to learning is a principle component of the PBL curriculum, a powerful and often misused and underappreciated tool at a postgraduate trainer's disposal is that of the Work-Based Assessments (WBAs). In my experience, there are frequent occasions where WBAs can be employed in a similar fashion to what was applied during university study, with particular reference to assessing knowledge or skills, encouraging the trainee to identify and fill any deficits in these, and subsequent reassessment. The use of Direct Observation Of Procedural Skills (DOPS) mini-CEX and Case-Based Discussions (CBD) lends themselves to this concept of assessment and reassessment. The process may either entail a procedure or examination process being observed on consecutive occasions and a direct comparison being made (DOPS/mini-CEX), or for a student to bring a case to a meeting for discussion, and be encouraged to do their background reading into the diagnosis prior to the meeting (CBD).

I feel one of my main roles in supporting surgeons in training currently is that of a supervisor and a mentor, and as discussed by Paice [28], I try to teach by example, and aim to inspire trainees. This in itself is also a form of leadership, as I take opportunities to train more junior colleagues in theatre when safe and appropriate, but take particular care to offer feedback. This allows mental digestion of the experience, often separate from the intense theatre environment, the importance of which was discussed by Pearson and Smith [29] and a motivated self-directed learner would use this reflection for learning as it is comparable to the enforced period for learning between PBL sessions. This form of leadership is similar to coaching, as described by McKimm and Swanwick [30] as it aims to help the trainee improve, with a period for reflection and learning between cases. This is comparable to the role that a PBL tutor plays, as it allows the tutor to guide the student, whilst asking the student to complete the background work themselves, rather than being didactic in the learning process.

Conclusion

PBL allows people to take charge of their learning objectives whilst still having a tightly bound, curriculum based approach. It encourages the development of independent, self-directed learning skills which are transferrable throughout the trainees' ongoing development as a doctor. It also has been proven to be of benefit in teaching professional and social skills, above that of a more traditional course. Care must be

taken by course designers, tutors and students alike not to omit essential areas of knowledge. To have an awareness of these potential weaknesses and have methods to address them is imperative when supporting surgical trainees, and the processes of utilising WBAs appropriately, encouraging reflection and staying abreast of the post-graduate curriculum are principles that can be used in every speciality and should be upheld as an educational leader.

The graduates of PBL courses, when they become educational leaders in the future may well be better equipped to utilise WBAs as intended, as they are aware of the comparisons between PBL and assessment with regards to reflecting upon performances, sourcing and addressing areas for improvement, and subsequently reassessing knowledge. Despite its drawbacks, PBL based medical schooling may well be an excellent preparative method for establishing reflective, adaptable doctors with a good understanding of educational leadership.

Notes on Contributor

Jennifer Smith is a final year surgical registrar training in Colorectal surgery. She completed the PGCE in Work-place based Postgraduate Medical Education in July 2012 and now runs an educational programme for foundation doctors in her current hospital.

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