

A NEW ONLINE INTERACTIVE PROBLEM BASED LEARNING PROGRAMME IN MEDICINE: A TUTOR'S PERSPECTIVE

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Abstract

During a Problem-Based Learning (PBL) tutorial, students explore patient scenarios, considering issues and solving problems as they work through a scenario, page by page. This study explored the impact on student behaviour of the replacement of these paper-based linear PBL scenarios with interactive 'branching' virtual patients. At key moments in the case, students are offered patient management options, take decisions, and explore the consequences of their decisions. This study has looked at the subsequent changes in individual and group behaviour, considering the length of discussion, the proportion of students involved, and evidence of increased 'community' while considering options.

Introduction

Increasingly, curricula in medicine are built around enquiry-based collaborative approaches to learning, predominantly Problem-based Learning (PBL). Guided by a tutor, students work in teams to explore, manage or solve a problem sharing their knowledge and understanding, agreeing on what they need to learn and how to carry it out. Medicine and health care education have been using this approach in the UK since the mid 1980s. Many evaluations of PBL have demonstrated that learners prefer this method of learning to traditional lecture-based teaching methods (Albanese & Mitchell, 1993; Norman & Schmidt, 1992; Vernon & Blake, 1993) though its efficacy has always been challenging to evaluate (Colliver, 2000; Finucane et al., 1998; Smits et al., 2002).

Typically, students discuss the emerging patient scenario at the beginning of the week. During a PBL tutorial, students explore patient scenarios, considering issues and solving problems as they work through a paper-based patient case, page by page. Guided by a tutor they share their existing knowledge, agreeing on what they need to learn and how to carry it out. However, although it is claimed that conventional PBL supports decision making, in reality the scenario itself cannot respond in any way to provide different courses of action, so no matter how students may wish to proceed in their patient management, the scenario is linear and inflexible.

St. George's University of London embarked on a trial which would examine the pedagogic advantage of using game-informed applications, to replace its conventional PBL cases with online interactive Virtual Patients (VPs). Virtual patients are interactive computer simulation of real-life clinical scenarios for the purpose of medical training, education, or assessment (Ellaway et al., 2006). In many ways they are the next step in a development cycle which has been going on for many years in medical education, as the way in which medicine is taught has evolved, to provide teaching and learning styles which are increasingly relevant to practice.

The objective of the new model was to enable medical students to engage in collaborative learning activities particularly exploring patient management that more directly mimic the competencies of experienced medical practitioners, and seamlessly blend online and face-to-face learning.

In controlled trials, the patient cases in a 6-week PBL module were converted to VPs, and delivered to 72 students in 10 tutorial groups. Five groups each week received 'branching' VPs (VPs with options and consequences), and five groups received online VPs without options. A comprehensive evaluation was carried out, using questionnaires, and interviews (Poulton et al., 2009). Students who had experienced 'options and consequences' in the tutorial performed better in exam questions based on the option points (Bakrania, 2010).

As a direct result of the response from students and tutors, the method was rolled out in the curriculum, initially in the Transitional Year between the early campus years and the clinical attachment years.

Both tutors and students believed that the ability to explore options and consequences created a more engaging experience and encouraged students to explore their learning. However during the trials little attempt had been made to quantify this behaviour.

Three main questions still remained for the PBL purists:

- Would students still carry out the same problem-solving group behaviour as before?
- Rather than exchanging information and exploring new knowledge, would they instead just share opinions?
- Would they lose interest in the new VP/PBL approach?

Inevitably student and tutor behaviour would change with the new delivery system, and this study sets out to consider these questions.

Summary of Methods

The Student Populations

St George's University of London had merged its undergraduate medical courses into a single course with separate entry pathways for graduates, school-leavers, and non-traditional learners from under-represented sectors. The key phase in which all these learners come together and are integrated is the Transitional (T) year, which alternates campus-based learning blocks with clinical attachments. One student from each group will access the case via the institutional Virtual Learning Environment (VLE) Moodle.

Figure 1: PBL Delivery before Virtual Patients



The Authoring and Delivery of Virtual Patients

The first step in writing a VP case for the T year was to take the basic PBL paper case and transfer it to the Visual Understanding Environment (VUE; Round et al., 2009) a freely available topic mapping tool used for designing clinical scenarios, narratives and schemas, and used to import scenarios into the VP delivery system, OpenLabyrinth (OL) (Ellaway, 2010). OL is an open source virtual patient authoring, delivery and analysis toolset, now in use in a number of different medical schools worldwide.

A new VP authoring system, Decision Simulation (DSim) (Benedict, 2010) was uniquely available to SGUL to create VP cases. DSim allows case writers to author the cases using an integrated mind mapping tool similar to VUE and preview the case as it progresses. Case writers reported that this tool was simple

Tutors were trained to take on the new PBL and asked to report back on any changes that the new-style tutoring would have on the tutoring process.

Data Collection by the Tutor

The study examined changes in individual and group behaviour, the proportion of students involved, and evidence of increased ‘community’ while considering options.

Figure 3: A Typical PBL Tutorial Room Layout
Showing the VP Case Delivered Online



A map of each PBL tutorial is produced which shows the various routes through the patient case (Figure 2) which is used as both a guide to the tutors during the tutorial to follow student discussion and also for students to view the map at the end of the tutorial. At this time they can discuss their options and consider the various ‘branches’ of the case suggested by the case writers.

For this study the map was used as the ‘notepad’ to collect data on the number of students who contributed to the discussion at each point in the case. Each point in the case points were described as either option points, where students were presented with options, or non-option points, or pre-option points. The simple data collection process used was to add a stroke each time a student contributed at a relevant point. In the second study, a student contribution to “knowledge” was indicated above the point (box on the map), and to “opinion,” below it.

An important feature of the PBL is that at the point where students are to be presented with options, they first discuss the “page” before the options are presented and we describe this as a “pre-option” point. At this point the prompt for students and tutors online is “Stop and discuss.”

There are two tutorials and usually three decision making points in each tutorial. Two distinct types of study were carried out within the seven groups of students and data was collected according the following criteria:

- The number of the students involved in the discussion on Non-Optional, Pre-Optional and Optional points of the case.
- The number of the students who contribute either “opinion” or “knowledge” contributions at non-optional and optional points

There were 7 groups used in the study, with a total of 62 students (14 Graduate entry, and 48 school leavers). In the first year of the implementation of the VP cases, 2009–2010, the data was obtained from 5 groups and 44 students, and in the following year, there were 2 groups of 18 school-leavers (see Table 1).

Table 1

Module	Cases	Year	Groups	Student entry	No. students
1	6	2009-2010	1	Graduate entry	8
1	6	2010-2011	2	School-leaver entry	9, 9
2	6	2009-2010	2	School-leaver entry	9, 9
3	4	2009-2010	2	School-leaver/Graduate	6/3 , 6/3
Total	22		7 groups		62

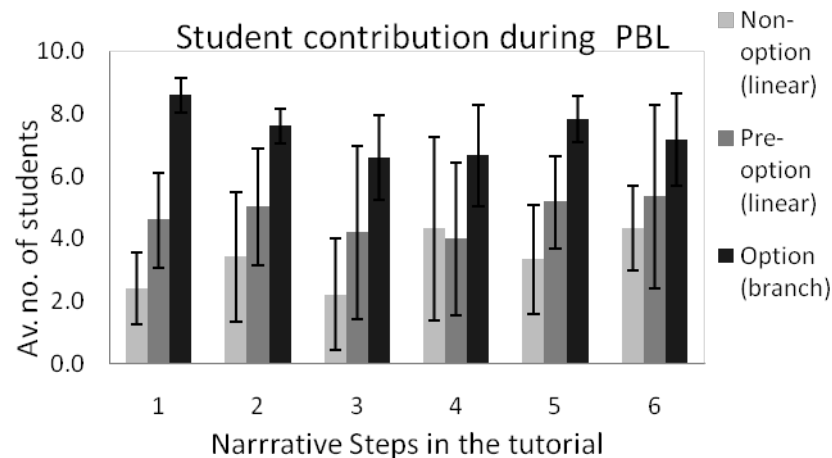
Results

The overall feedback from the new VP/PBL delivery was that both tutors and students believed that the ability to explore options and consequences created a more engaging experience and encouraged students to explore their learning.

Changes in Student Behaviour

The proportion of students participating in each step of a scenario changes as students move from non-option to option steps. Significantly higher proportion of students make contributions at option points in the case (Figure 4). Students become more engaged with the patient case and work well as a team, at those points where the PBL becomes effectively a problem-solving game.

Figure 4: The Average Number (+/-S.E) of Students Contributing to Discussion*



*throughout a six tutorial module, at six different points in the tutorial (horizontal axis): points were Non-Optional, Pre-Optional and Optional points.

Non-option, Pre-option and Option points. A higher proportion of students are consistently involved in the discussion on optional points (total contributions: group 1, 244 students; group 2, 142) than on non optional points (group1, 112; group 2, 78). Results for Pre-option points generally fell between the two (group 1, 156; group 2, 98). Most students (i.e., greater than 60 %) of the group contribute at optional points than at non-optional points. A typical example of the collated results for group 1 is shown in Figure 4.

Contribution to knowledge or opinion. Across two modules totalling 12 cases, students made contributions of knowledge more than opinion to a greater extent at optional and pre-optional points (127/118 knowledge/opinion) whereas at non-option points the knowledge contribution was very low (127/35).

Student Views

Many students expressed the view that options made the underlying knowledge base more memorable. Consistently errors seemed to be the most memorable part of the PBL experience, and poor choices seemed particularly memorable.

The Changing Role of the Tutor in Interactive PBL

There were two changes. Firstly, tutors did not need always to guide students to 'correct' decisions since the outcome of the decision would provide them with more natural feedback through the consequences of their actions. Secondly, bad choices could also carry good learning opportunities so the tutor needed to ensure that the students were fully exposed to the full learning opportunities that the options offered.

Conclusions

This study addressed three issues in the VP PBL that had concerned PBL specialists and traditionalists. Firstly would having choices interfere with problem solving; secondly, would students be inclined to just 'guess' the correct decisions rather than using the collaborative process to obtain and explore new knowledge; thirdly, would students respond negatively to the new VP/PBL, would they become over familiar with the process and lose interest?

It is true that the presence of options in the new cases had a profound effect on student behaviour, but this was almost entirely positive. The response to interactive PBL has been an improvement in group discussion, knowledge sharing, and group involvement. PBL groups appear to modify their team behaviour, working as a community to solve a true problem, when the opportunities to take real decisions appear. It is particularly pleasing that the process of taking a decision seems to produce an even greater increase in knowledge sharing than in students volunteering opinions, when the students discuss which option to take. Furthermore the pattern of behaviour over length of the module does not show any reduction in student engagement; they do not 'lose interest'.

The VP/PBL approach emerged as an excellent way to bring the school –leavers and graduates together, because the necessity to take a decision provides the opportunity to forge a more inclusive community spirit. This would be a very good tool to use in inter-professional learning

For the tutor the VP PBL process of tutoring was less interventionist but more thoughtful. Both tutors and students believed that the ability to explore options and consequences created a more engaging experience for both, as well encouraging students to explore their learning.

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