Advantages of Video Trigger in Problem-based Learning

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Abbreviated title: Video trigger in problem-based learning

ABSTRACT

Background

Traditionally, paper cases are used as 'triggers' to stimulate learning in problem-based learning (PBL). However, video may be a better medium because it preserves the original language, encourages the active extraction of information, avoids depersonalization of patients and allows direct observation of clinical consultations. In short, it exposes the students to the complexity of actual clinical problems.

Aims

The study aims to find out whether students and facilitators who are accustomed to paper cases would prefer video triggers or paper cases and the reasons for their preference.

Method

After students and facilitators had completed a video PBL tutorial, their responses were measured by a structured questionnaire using a modified Likert scale.

Results

A total of 257 students (92%) and 26 facilitators (100%) responded. The majority of students and facilitators considered that using video triggers could enhance the students' observational powers and clinical reasoning, help them to integrate different information and better understand the cases, and motivate them to learn. They found PBL using video triggers more interesting and preferred it to PBL using paper cases.

Conclusion

Video triggers are preferred by both students and facilitators over paper cases in PBL.

INTRODUCTION

Barrows (1986) has described problem-based learning (PBL) as 'a genus for which there are many species and subspecies', meaning that there are many different implementations of PBL, each with a different emphasis. Charlin et al. (1998) outlined 10 dimensions along which different PBL implementations can differ from each other. One of those 10 dimensions is the presentation of the problem, or the trigger, which can include the traditional paper cases, newspaper clippings, audio-tapes, video recordings, computer softwares, 'standardised' patients (i.e. actors playing the roles of patients) and real patients (Charlin et al., 1998; Davis and Harden, 1999; Azer, 2007).

Paper cases are logistically easier to produce. They can be created based on real patients, but the cases can also be written using hypothetical patients created to suit the desired teaching and learning outcomes. No real patient needs to be present during the PBL triggered by paper cases, which can thus take place at a place and time agreed upon by the students and the facilitator. Paper cases can be stored, retrieved, modified, and used as many times and as often as needed, which is obviously not the case with real patients. Paper cases also cost less to produce, when compared to video triggers, the production of which oftentimes involves professional audiovisual crews and actors, the production of a transcript and subtitles, and the purchase of hardware used for their dissemination and playing. The paper cases are also the most controlled presentation of the problem in PBL (Coles, 1991), since the information that the students need to know is already retrieved, transcribed, and, to a certain extent, interpreted.

The major problem with paper cases is that they do not realistically simulate the challenges of problem-solving in the clinical environment. They are far removed from the situations students will face in the clinical setting (Barrows, 1994). Doctors seldom diagnose on the basis of verbal descriptions like those provided in paper cases. Before arriving at a

diagnosis, they need to talk to the patient, extract the necessary and relevant information, perform a physical examination, and interpret the signs and investigation results.

Video triggers seem to possess many features that are lacking in paper cases and may make them superior to paper cases as triggers in PBL.

• *Preserve the original language of the clinical consultations*

In Hong Kong, Cantonese (A Chinese dialect) is the usual language of over 90% of the population (Census and Statistics Department of The Government of the Hong Kong Special Administrative Region, 2006). Most of the medical students and the patients they encounter speak Cantonese, which is the language of most clinical consultations in Hong Kong. However, the medium of instruction at The University of Hong Kong is English. The PBL discussion, whether it takes place after a paper case or a video trigger, is also completely in English. The PBL paper cases are written in English. Paper cases written in English are therefore translations of clinical consultations conducted in Cantonese. When paper cases are use, medical students are denied the opportunity to listen to the patient in the original language and words, and make their own judgments about the patient's condition. Video triggers, on the other hand, preserve the original language of the clinical consultations, presenting the clinical problems in the original form that the students will encounter in their later years.

• *Encourage the active extraction of patient's clinical history*

In a PBL session triggered by a paper case, what the patient said is interpreted and summarised for the students. Video triggers are superior to paper cases in allowing the students to listen to the patient's actual complaints, and to extract the relevant information before engaging in the discussion. This is much closer to the problem-solving process they

will go through in the actual clinical setting. Defining the problems in the first place is just as important as solving them.

• *Avoid depersonalization of the patients*

Paper cases detach the students from the 'messiness of real patients' lives and emotions' (Kenny and Beagan, 2004). What the patient expressed nonverbally and verbally has been edited and then presented as a case history. In this process of editing and presentation of information, choices on what information to present are made intentionally or unintentionally. Oftentimes only information considered relevant to making the diagnosis and the subsequent management is included in the case history. The patient is presented as a case and not as a person. This depersonalisation is further encouraged by the language employed in presenting the case history, which grants 'primacy to the observation of medical staff, …, while devaluating or eliminating the patient's interpretation of reality.' The use of passive voice in case histories, by eliminating the observer, gives what is being reported in the case history an authoritative and factual status, e.g., 'it was observed that'. And the patients' reported speech is oftentimes marked by linguistic codes that signify scepticism, e.g., 'the patient claims that'.

Thus, a case history in a paper case is often only the story from the perspective of the doctor, stripped of extraneous information and the patient's language and point of view. Doubts have been expressed on whether this should be the way medical students first encounter patients in their early medical education, since it promotes a position of detachment from the patient (Kenny and Beagan, 2004). One way to avoid the promotion of such attitude is the use of thick cases, in which a much richer description of the patient and the various aspects of his or her life are presented (Davis, 1991). But a thick case is very difficult to produce and is still text-based. Of course, the ideal solution would be to use a real

patient in PBL (Charlin et al., 1998; Kenny and Beagan, 2004), but this would be too expensive and impractical. The next alternative is certainly video triggers, which present the patient visually and audially, capturing his or her appearance, gestures, voice and expressions, i.e., presenting the patient as a human being and avoiding the depersonalisation that can easily occur in paper cases.

• Preserve nonverbal information about the patient

In paper cases, all the information is delivered in writing, and necessarily comes in a linear fashion, one piece at a time. However, this is not the case in a real consultation. When a patient comes in for a consultation, information about the patient comes in many different ways at the same time (Fielding, 1995), both verbal and nonverbal. There are many types of nonverbal information to pay attention to: the appearance of the patient, the facial expression, the gestures, gait, movement, personal hygiene and even his or her emotional state. In a written text, most of these clues must be either be described for the students or are lost entirely. Even more important are the results of the physical examination, many of which can be observed in the video and then interpreted by the students. Video triggers are superior to text cases in that much of the nonverbal information described above is preserved. The students need to pay attention to all of the information that is important to the case, just as a competent doctor would, i.e., they need to be active processors of information (Charlin et al, 1998). Therefore, the use of video triggers may not only enhances the students' observational powers, but may also encourage integration of information.

• Allow observation of patient-doctor interaction

In paper cases, only the 'results' of the patient-doctor interaction were presented to the students: the history taken and the results of physical examination. However, the

'process' of that interaction is an excellent opportunity for the students to learn how doctors interact with patients: how patients ask questions and react to their diagnosis, how doctors listen and talk to patients, how to explain an operation or treatment strategies, how to handle difficult questions, etc. Video triggers may be superior to paper cases in that they preserve this learning opportunity for the students. The students thus learn the behavioural aspects of clinical encounters by imitating the doctors in the video. Such behavioural learning has been considered to be one of the many advantages of using PBL (Walton and Matthews, 1998).

• *Allow observation of clinical reasoning skills*

In a paper case, the history of the patient and the results of the physical examination are oftentimes not presented in the sequence in which they were obtained in actual clinical situations. Video triggers, however, show the actual sequence of obtaining the history and performing the physical examination, and therefore how each piece of information leads to another action (another question or a test in physical examination). The video trigger allows the students to observe the clinical reasoning process of the doctor: how working hypotheses are formed, how each is eliminated or supported, and how the final diagnosis is reached. This problem-solving or clinical reasoning skill is one of the goals that educators want to achieve with PBL (Barrows, 1986, 1994; Norman and Schmidt, 1992; Walton and Matthews, 1998). Video triggers may thus be superior to paper cases in helping the students to achieve this goal, by directly showing them the clinical interaction guided by the reasoning process of experienced doctors.

• *Increase the motivation to solve the problem*

The students' goal is to become a doctor in the real clinical environment, treating real patients. In video-triggered PBL, they experience the image and voice of a real patient,

instead of a character in a text. Video-triggered PBL may therefore stimulate the students' desire to learn, and the students may also be more motivated (de Leng et al., 2007).

For PBL to be successful, self-directed learning is very important. After the students have identified the learning issues, they will then need to look for new information and construct new knowledge in order to solve the problems at hand. This whole process of self-directed learning is primarily driven by motivation.

• *Stimulate cognitive processes*

Balslev et al. (2005) showed that the verbal interaction among the students exposed to a video case, compared to those exposed to a paper case, contained more clauses related to data exploration, theory building and theory evaluation, indicating that the cognitive process was stimulated. Their finding is predictable from the cognitive load theory and multimedia principle of learning, which postulate that the working memory is more fully utilized when both the visual and auditory channels of information processing are used (Mayer, 1999). Kamin et al. (2001, 2003) compared the critical thinking in PBL using text cases to that using video cases, by applying the technique of content analysis. It was found that the video groups showed increased critical thinking in all stages of critical thinking, except for the problem identification stage.

Cognitive theory has identified the importance of activation of prior knowledge, on which new knowledge is constructed, and the importance of context in learning (Schmidt, 1983; Norman and Schmidt, 1992; Regehr and Norman, 1996; Maudsely, 1999). In paper cases, the patient is only presented as a character on paper. By watching and listening to patients in clinical situations, student are reminded of their own experience in similar situations, therefore activating their prior knowledge. Moreover, the new knowledge that the students gain by watching these clinical situations will be more easily recalled and applied in

similar future clinical encounters (Barrows, 1986; de Leng et al., 2007). The learning process is thus more effective in video-triggered PBL than in text-based PBL.

Because of these advantages, the Li Ka Shing Faculty of Medicine at The University of Hong Kong has introduced video triggers to replace some of the paper cases. But some of the advantages listed above for video triggers are based on theoretical analyses, while some are based on studies on limited number of students. We therefore would like to find out the overall preference of the students and facilitators who are accustomed to paper cases and the reasons for their preference.

METHODS

The Li Ka Shing Faculty of Medicine of The University of Hong Kong, in collaboration with Tsinghua University and Zhejiang University of the People's Republic of China, has produced video clips of actual and simulated patients for use as triggers in PBL tutorials. The patients have consented to the filming, which was done by a professional audiovisual team, in an actual clinical setting, such as an outpatient clinic or a hospital ward. For each patient, three to four short video clips were produced. The average length of these clips is 3 minutes. The first clip is usually the medical consultation, performed by an actual doctor. The subsequent clips are usually the physical examination and follow-up medical consultations focusing on the discussion of investigation results and treatment options. All medical consultations in these two video triggers were conducted in Cantonese, which can be understood by all the medical students at HKU, although subtitles in English and Simplified Chinese were also provided. When video triggers are used in the PBL tutorials, no written

information at all is given to the students; i.e., the only materials presented to the students are the video clips.

One video trigger, on a patient with peptic ulcer disease, has been introduced into the gastrointestinal block, in the first year of the medical programme, and was used by all first-year medical students. Another one, on a patient with low-back pain, has been introduced into the musculoskeletal system, in the second year of the medical programme, and was used by all second-year students.

There were between 120 to 130 students in the first and second year. For the PBL tutorials, they were divided into groups of about 10, guided by a non-expert teacher as the facilitator. The video clips were distributed to the students on DVDs and used in exactly the same way as the sections of a paper case in a PBL tutorial. Students were shown one video clip at a time, followed by a discussion in which they tried to identify the learning issues, with the help from the facilitator. After they had completed the whole PBL tutorial (i.e., all the video clips of the same patient) the students and the facilitators were given a questionnaire (Tables 1 and 2), to measure their responses to the use of the video trigger. Participation was entirely voluntary.

RESULTS AND DISCUSSION

Out of 257 medical students given the questionnaire, 237 responded (92%). All 26 facilitators responded to our questionnaire. The results are shown in Tables 1 and 2.

The majority of students and facilitators considered the video clips to be more interesting and preferred using video triggers over using paper cases in the PBL tutorials. Some of the advantages of video triggers mentioned in the Introduction section might have contributed to this finding: (1) preserving the original language of clinical consultation,

which is also the mother tongue of the majority of the students; (2) avoiding depersonalization of the patients, so that the students feel that they are seeing a real person and not a character on paper (Kenny and Beagan, 2004); and (3) allowing direct observation of patient-doctor interaction and clinical reasoning skills.

The majority of students and facilitators considered that video triggers can help the students to develop their clinical reasoning and observational power. They also thought that video triggers could help students to integrate their learning of clinical examination skills, practical and interpersonal skills and data interpretation. These results can be explained by the fact that video triggers preserve both the verbal and nonverbal information from the patient, therefore encouraging the active extraction of information from the patient's clinical history. Video triggers also allow direction observation of patient-doctor interaction, performance of physical examination and clinical reasoning skills.

Most students and facilitators also found that video triggers could facilitate the students' understanding of the cases. This could be explained by the stimulated cognitive process in PBL triggered by videos (Kamin et al., 2001, 2003; Balslev et al., 2005).

The majority of students and facilitators considered that video triggers stimulate the students' self-directed learning. This is probably due to the increased motivation to solve the problem (de Leng et al., 2007).

Despite the numerous advantages of video triggers discussed above and the positive reaction of students and facilitators, video triggers cannot replace real patients in clinical situations in training students' problem-solving skills. There is no interaction between the students and the patient in the video. The students cannot ask the patient any questions. They can only listen to the answers the patient gives to questions asked by the doctor in the video. So the clinical reasoning process of the students is not fully challenged (Barrows, 1994). Moreover, the complete medical consultation may be much longer than three minutes, the

usual length of a video clip on medical consultation in our video-triggered PBL cases. So a certain degree of simplification of actual clinical encounters with patients still occurs in video triggers.

Other disadvantages of video triggers are the cost, especially when standardized patients and professional audio-visual teams are involved, and the time needed for their production. Post-production editing can also be costly if subtitles are added. But video triggers can also be produced in less costly ways, depending on the quality of the videos required.

The distribution of these video triggers to the students is another issue. Distribution of the video triggers over the computer network can create a heavy load on the local network when all the PBL groups use the video triggers at the same time. Making the videos available this way may also violate the privacy of actual patients. An alternative is to supply the video triggers on DVD and to lend them out to students and collect them back after the PBL sessions are completed.

CONCLUSION

The findings in this study suggest that video triggers are much preferred over paper cases in PBL by students and facilitators. By presenting the patient as a real person with a face, who talks, feels, and worries, instead of a character on paper, the video trigger closes the gap between PBL on paper and real-life problem-solving in the ward. The whole PBL learning experience is made much more human and realistic. The consequence is that the video trigger not only stimulates a more effective learning process but also the students' motivation to become a doctor. The students are therefore much more engaged in the learning process, and are more motivated in their self-directed learning. The learning process is further

enhanced by promoting the students' observation and reasoning power, and their ability to integrate different information. Video triggers are thus much preferred over the paper cases by both the students and the facilitators.

ACKNOWLEDGEMENTS

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> Practice points
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> - Video trigger is much preferred over paper cases in PBL even by students and facilitators who are used to paper cases
> - Video triggers can be used in the same way as paper cases in PBL
> - Using video triggers in PBL helps to bridge the gap between classroom learning and clinical experience

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Table 1: Responses of students to questionnaire

Responses / Questions	Strongly disagree				Strongly agree		
	1	2	3	4	5	6	4+5+6
1. The use of PBL video triggers made the PBL tutorials more interesting.	0.0%	0.8%	7.6%	23.7%	43.2%	24.6%	91.5%
2. PBL video triggers can enhance my clinical reasoning process.	0.0%	1.7%	11.0%	40.7%	30.5%	16.1%	87.3%
3. PBL video triggers can help to develop my observation power.	0.0%	0.9%	11.1%	30.8%	40.2%	17.1%	88.1%
4. PBL video triggers can integrate the learning of clinical examination, practical and interpersonal skills and data interpretation.	0.0%	2.6%	6.8%	32.5%	45.3%	12.8%	90.6%
5. PBL video triggers can facilitate my learning and understanding of the case.	0.0%	5.1%	21.2%	29.7%	34.7%	9.3%	76.6%
6. PBL video triggers can enhance self-directed learning.	0.0%	6.8%	30.5%	39.8%	16.9%	5.9%	62.6%
7. I prefer to use PBL video triggers rather than PBL paper cases at PBL tutorials.	4.2%	5.1%	15.3%	33.1%	23.7%	18.6%	75.4%

Table 2: Responses of facilitators to questionnaire

Responses / Questions	Strongly disagree					Strongly agree	
	1	2	3	4	5	6	4+5+6
1. The use of PBL video triggers made the PBL tutorials more interesting.	0.0%	0.0%	0.0%	15.4%	30.8%	53.8%	100%
2. PBL video triggers can enhance students' clinical reasoning process.	0.0%	0.0%	7.7%	23.1%	23.1%	46.2%	92.3%
3. PBL video triggers can help to develop students' observation power.	0.0%	0.0%	7.7%	15.4%	53.8%	23.1%	92.3%
4. PBL video triggers can integrate the learning of clinical examination, practical and interpersonal skills and data interpretation.	0.0%	0.0%	7.7%	38.5%	23.1%	30.8%	92.3%
5. PBL video triggers can facilitate students' learning and understanding of the case.	0.0%	0.0%	26.9%	19.2%	23.1%	30.8%	73.1%
6. PBL video triggers can enhance self-directed learning.	0.0%	0.0%	26.9%	34.6%	23.1%	15.4%	73.1%
7. I prefer to use PBL video triggers rather than PBL paper cases at PBL tutorials.	0.0%	7.7%	7.7%	38.5%	15.4%	30.8%	84.6%