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ARTICLE

Differ in Socio-Cognitive Processes? Some Comparisons Between Paper and Video Triggered PBL

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This paper investigates whether paper and video triggers stimulate different social and cognitive processes during PBL. The study focused on how medical students identified and described problems, and how they built shared cognitions that lead them to diagnose and solve problems. The results showed that students who used video triggers put more effort into communicating their understanding of the problem and relevant knowledge than students who used paper triggers. The findings contribute to discussions on how to evaluate the effectiveness of different PBL triggers in order to better integrate them into the curriculum.

Keywords: cognitive processes, communicative processes, paper trigger, video trigger, problem solving, problem identification, problem description, shared cognition

Introduction

Since the introduction of problem-based learning (PBL) into medical schools, paper triggers have been the dominant format for introducing problems. Recent advancements in information technology have stimulated efforts to use technology to make PBL cases more authentic and effective. This study investigated whether and how paper and video triggers lead to different learning processes in PBL in order to contribute to discussions on evaluating the effectiveness of technology supported cases and how to integrate them into the PBL curriculum.

In traditional paper triggered PBL, problem cases are usually presented by means of written texts (Davis & Harden, 1999), because in such texts the information that students need to solve problems can be organized logically and concisely (Chan, Patil et al., 2012; Hoffmann & Ritchie, 1997). However, just as the experience of reading well-written descriptions of dishes on a menu differs from enjoying the aroma, flavors, and textures of the same dishes in a restaurant, the experience of reading descriptions of medical problems is not the same as facing the same problems on a hospital ward. Reading about and solving medical problems in the classroom is far removed from assessing and treating them in clinical settings. Written descriptions of medical conditions transform the immediate perceptual and cognitive experiences associated with assessing and treating them in real clinical settings into written descriptions composed of words, sentences and paragraphs that present students with information that the case writer regards as relevant for assessing and treating it. Unlike written descriptions of clinical cases, videos presentations of cases provide a richer and more complex ways of learning (Derry, Hmelo-Silver, Nagarajan, Chernobilsky, & Beitzel, 2006), which facilitate students to develop the ability to perceive and represent the dynamic and evolving nature of medical conditions and to develop pattern recognition skills (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990). They may also help to lay the foundation for developing a more holistic and patient-centered approach to training health care professionals (Bizzocchi & Schell, 2009).

PBL is a process in which groups of students work collaboratively to solve complex problems (Barrow, 2000; Hmelo-Silver, 2004). A prerequisite of collaboration is for group members to establish shared cognitions to support the construction of shared knowledge and understandings (Baker, Hansen, Joiner, & Traum, 1999). Because paper and video

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triggers present problem cases in different ways, PBL groups construct their shared understandings in different ways. Consequently, this study focused on providing a better understand of the different ways in which students use paper and video triggers to construct shared understanding in order to evaluate the effectiveness of different problem presentations and to select triggers appropriate to different learning needs.

Socio-Cognitive Processes in PBL

PBL involves both cognitive and social components, independent but also intertwined. Different cognitive models of PBL have been proposed including the problem-based learning cycle model (Hmelo-Silver, 2004) and the five-stage critical thinking process model (Kamin, O'Sullivan, Younger, & Deterding, 2001) which we adopt here. The five stages are: 1) problem identification, 2) problem description; 3) problem exploration; 4) applicability, and 5) integration. Here we focus on stages 1 and 2 as Chan et al. (Chan, Lu, Ip, & Yip, 2012) have shown that paper and video triggered PBL are similar in stages 3, 4, and 5.

Identifying and describing problems are important in solving medical problems, which are often ill-structured, and being able to identify them early on in the problem solving process can help assure success in the later stages. Problem identification involves recognizing and extracting relevant information from the presented case, which depends on knowledge of relevant concepts and principles. Consequently, it constrains what students need to learn first by specifying basic learning issues and objectives. It has been shown that the format in which problems are presented affect problem identification (Bransford et al., 1990) and video simulations can improve the acquisition of problem identification skills (Roberts, 2000). For instance, although a written description such as "right leg moving with limitation" expresses expert pattern recognition, it cannot help students make diagnoses in real world contexts as it does not express the very pattern recognition skills on which the judgment depends.

In problem descriptions, students go beyond identifying problem related information to forming representations of problems by relating them to their prior knowledge and experience. Students also define and articulate problems by stating the goals and scope of the problem-solving process whose representations, unlike those of well-structured problems, are often ill defined and complicated by multiple possibilities.

PBL cases contain information that students need to identify and evaluate, and, when cases are presented in different formats (e.g., text, video), they need to use different cognitive strategies to construct problem representations. As with problem identification, students may need to put extra effort into identifying relevant patient information presented in videos of doctor-patient interactions as compared to when it is presented in written description of such interactions. This might require greater effort in communicating their understandings of the problem to other students. Thus, in collaborative problem solving scenarios, building shared understanding by identifying and describing the problems is very important for students to successfully solve the problem, make appropriate diagnoses and differential diagnoses.

PBL also involves communicative and social processes when students seek to make their thoughts explicit to others. They need to develop patterns of discourse to carry out effective collaborative problem solving. Discourse strategies such as questioning and elaborating are essential for building shared understandings. During problem solving, learners ask and answer questions to prompt their explanation and thinking (Visschers-Pleijers, Dolmans, Wolfhagen, & van der Vleuten, 2002). These questions are integrated into different problem solving stages—identifying and representing problems and searching for, implementing and evaluating solutions. Hmelo-Silver and colleagues (Hmelo-Silver & Barrows, 2008; Hmelo-Silver, Chernobilsky, & Jordan, 2008) found that in PBL environments, students who formulated many questions and explanations had superior problem solving skills. The questions ranged from short close-ended information seeking questions to longer open-ended explanation seeking questions.

Corresponding to these types of questions are different kinds of responses: justified elaborations (including explanations, examples, or information to justify elaboration), simple elaborations (including definitions, examples, etc. without causal warrants), and simple statements (including claims or assertions without elaborations or justifications) (Hmelo-Silver & Barrows, 2008). Elaborations can occur in group learning situations when learners consider pieces of knowledge in richer and wider contexts (van Boxtel, van der Linden, & Kanselaar, 2000). It has been found that in PBL, elaboration is an important contributor of cognitive effects (Schmidt & Boushuizen, 1993; Schmidt, De Volder, De Grave, Moust, & Patel, 1989).

Cognitive and communicative processes are intertwined in PBL and such mechanisms can be better understood in the context of shared cognition that emphasizes cognition not as just an individual activity but as a socially constructed one. Video and paper triggers play different roles in stimulating cognitive and communicative processes.

Shared Cognition and Role of Anchored Instruction

The theory of shared cognition is rooted in a deepening awareness that learning should occur in authentic or meaningful situations (Brown, Collins, & Duguid, 1989). Shared cognition views learning as an integral part of the social environment in which students learn. Instead of focusing on

the cognitive processes of isolated individuals, it focused on group learning processes. Socially shared meanings cannot be reduced to the cognitive processes and mental representations of individual learners, but rather arise through the socio-cognitive interactions and shared artifacts of groups of learners (Resnick, Levine, & Teasley, 1991). Shared cognition views collaborative learning as a process of building and maintaining shared representations and understandings in authentic learning environments (Roschelle & Teasley, 1995).

Paper and video triggers present problems to PBL team members who then build shared representations which incorporate shared understandings of task goals and relevant knowledge (Cannon-Bowers, Salas, & Converse, 1993). Given that building shared understandings in authentic situations is the foundation of collaborative learning, problem solving, and decision making, the format in which problems are presented is very important. This issue has been well discussed in work on anchored instruction, emphasizing the creation of "an anchor or focus that generates interest and enables students to identify and define problems and to pay attention to their own perception and comprehension of these problems" (Bransford et al., 1990, p. 123). Reading descriptions of doctor-patient interactions and watching and listening to videos of doctor-patient interactions create different experiences of understandings and perceptions. To describe such interactions, the authors of paper triggers, usually medical experts in the field, transform them into grammatically cohesive and conceptually coherent texts that students must be able to read, interpret, and summarize in order to construct shared understandings. Moreover, descriptions such as "very anxious" or "severe pain" involve expert pattern recognition and interpretation. Videos, however, present doctor-patient interactions more directly and holistically with verbal, physical, and emotional information embedded and open to different interpretations. Students, who are novices, will develop pattern recognition skills of patients' problems on their own though this may take time. However, how will students develop such skill simply by reading expert summaries? Videos and written texts present problem scenarios in different ways and thus require students to engage in different types of collaborative activities to build productive shared understandings.

This study examines the differences in socio-cognitive processes in collaborative problem solving between paper and video-trigger PBL. It focuses on how students use information, ask questions, and give elaborations to solve problems and construct shared understanding during the problem identification and description stages (Kamin et al., 2001) of the PBL processes. It is assumed that major differences existed in these two stages between the text-triggered and video-triggered cases. The research question can be broken down into three smaller questions.

1. Do the cognitive processes in which students identify and describe problems differ for paper-triggered and video-triggered PBL? How?
2. Do the communicative processes in which students identify and describe problems differ for paper-triggered and video-triggered PBL? How?
3. How do students solve the problems together in paper-triggered and video-triggered PBL?

Methods

Curriculum Context

The undergraduate medical curriculum of the University of Hong Kong was reformed in 1997 to adopt a system-based and problem-based approach. The course of study is five years long and students are predominately Hong Kong natives who enter the programme after high school. On average, students in years 1 and 2 participate in two two-hour weekly paper-triggered PBL tutorials. Video-triggered tutorials have recently been introduced using clips of actual or simulated doctor-patient interactions. These include (1) history takings, (2) physical examinations, and (3) discussions of investigation results and treatment options. Several video cases are currently in use and more will be introduced pending evidence of their effectiveness.

PBL Cases

This study compared video and paper triggers of problems involving the musculoskeletal system. However, as the study focused on one intact PBL class, it wasn't possible to use both paper and video triggers to present the same case. Consequently, the video trigger presented a 65-year-old man suffering from back pain due to lumbar spondylosis (lumbar spine degeneration) and the paper trigger presented a 60-year-old man suffering from bilateral knee pain due to knee osteoarthritis (knee degeneration). The study described how the same group of students solved different problems using paper and video triggers.

The paper trigger was written in English and the video trigger presented a doctor and patient conversing in Cantonese. All tutorials were conducted in English although students and the facilitator occasionally switched to Cantonese, for example, to discuss traditional Chinese medicine (less than 1% of the time). As English is the sole medium of instruction and almost all students are fluent in both English and Cantonese in Hong Kong, language is not an issue that might cause differences in PBL.

Students and facilitator spent two two-hour tutorials on each case (i.e., four hours per case). The facilitator disclosed information about the case progressively. In the first tutorial,

Table 1. Coding schema of the PBL stages (adapted from Chan, Lu, Ip, & Yip, 2012)

Stage		Examples (P: paper-triggered case; V: video-triggered case)
Problem identification		
New problem-related information	P	He felt discomfort in both knees which was worse on the right side
	V	He finds that the pain's more severe when he walks and stands but it subsides or actually is less when he sitting down
Problem description		
Discuss ambiguities or facts to clear them up; push limits of knowledge	P	(after reading from the paper trigger that the patient had his ESR checked) I think the ESR is checking for suppurative arthritis
	V	How old is he . . . not mentioned in the video, but he's already retired for long time . . . so probably 60–70
Drawing on personal experience	P	From my relative's experience of using . . .
	V	This is the experience of my patient, she said she had . . .

P: paper-trigger; V: video-trigger

Table 2. Coding schema of questions and elaborations during collaboration

Category	Definition	Examples
Types of Questions		
Confirmation questions	The purpose of the questions is seeking "Yes" or "No" answers	*Any degenerative changes?*
Information oriented questions	The purpose of the questions is seeking facts, evidence, or simple elaboration	*What kind of things likely?*
Justification oriented questions	The purpose of the question is seeking for justified elaboration	*What do you think of sudden inflammation because for the past six months it has been ok?*
Levels of Elaborations		
Information	Directly identified from written description in the paper case or verbal communication and interpretation from the physical examination in the video case.	*Mr. Ho is a 60-year-old man*
Simple elaboration	Provide information in the case to support diagnosis	*It is common for an old man to have osteoarthritis because he is also complaining of discomfort in both knees*
Justified elaboration	Justify diagnosis based on prior knowledge and personal experience using causal relationship reasoning	*Because Mr. Ho had to walk all the way up to his house and walk down again for the past 15 years so that the demand on his knees are much more than normal*

students received the patient history, clinical consultation, and physical examination and discussed various hypotheses. In the second tutorial they reported on learning objectives based on the first tutorial, and received and discussed laboratory results and clinical management. This study focused on the first tutorial in which students received information pertinent to the two PBL stages we investigated: problem identification and problem description.

In the paper trigger, students read written descriptions of the patient's chief complaint, history, physical examination, laboratory tests, and clinical management plans while in the video-trigger, students watched video clips of the doctor taking the history, performing the physical examination, and discussing management plans with the patient. Students took notes while watching the video and could rewatch it if they wished.

Subjects

A group of 11 second-year medical students and their facilitator were recruited for the study. The same group and

facilitator participated in both paper-triggered and video-triggered PBL.

Data Analysis

All tutorials were recorded and transcribed. Parts of the transcripts of history taking and the physical examination were qualitatively analyzed using two coding schemes. One coding scheme used by Chan et al. (2012) for analyzing the stages of critical thinking during PBL was adapted from Kamin et al. (2001) and used to identify parts of discussions corresponding to problem identification and description (Table 1). The other coding schema was developed bottom-up (Table 2) for analyzing the types of questions and levels of elaborations used in PBL discussions based on history taking and physical examination videos. Questions were classified as information-oriented, justification-oriented, and confirmation questions, and elaborations were classified as information, simple elaboration, and justified elaboration, based on Hmelo-Silver et al. (2008).

The basic unit of coding was the conversational turn according to which a "new turn started when speakers changed. These were parsed into additional units when a different type of discourse move was observed." (Hmelo-Silver & Barrows, 2008, p. 59). For example, a turn in which a student asked a question and provided a justification was parsed into two coding units. A research assistant coded all sessions. Samples of 25% of the transcript were randomly selected from the two sessions and were checked and coded by the first author. Discrepancies were discussed and then modified. Research questions 1 and 2 were answered with descriptive analysis supplemented with examples. Research question 3 was analyzed qualitatively with rich descriptions.

Results

1. Do the cognitive processes in which students identify and describe problems differ for paper-triggered and video-triggered PBL? How?

How patient case information is utilized is examined to answer this question. Problem identification involves recognizing relevant known and unknown information. Students identified a similar amount of information in both cases in history taking: 14 units of information in the paper case (nine on page 1 and five on page 2) and 17 units of information in the video case. However, there were major differences in the physical examination: one unit of information in the paper case and 23 units of information in the video case.

In the video case, the group needed to identify and verbalize all relevant information from the video in order to build up shared understanding. In the history taking stage, all the information was audible. But in the physical examination stage, the students needed to observe and interpret the video images. For instance, in *babinskis is negative*, *negative* is an interpretation. To arrive at these shared understandings, group members voiced their observations and shared them with others, thus accounting for the large number of facts or observations in the physical examination of the video case. In the paper case, only the relevant information, as judged by the case writer, had been included in the paper trigger, while the video trigger contained much more information, both relevant and irrelevant to the diagnosis. The group might have felt a greater pressure to identify all the information in the video to serve as shared understanding for future purposes.

Describing problems involves defining them and generating mental representations of them. It involves discussing ambiguities to clear them up, or to draw on personal experiences to understand the case. Students select relevant information and communicate it so as to analyze and understand the problem before planning further history taking or physical examinations or take any actions. Paper-triggered and video-triggered cases contained 76 and 105 units of information respectively for problem descriptions in their parts on history taking and physical examination. The discourse content was also richer in the video case than in the paper case. This was particularly obvious in the physical examination where students interpreted what they observed in the video. For example:

> **Student 1:** The range of motion of forward bending I think is about 45 to 50 degrees and for backward he showed there is 20 to 30 degrees and the lateral sides were about 20 to 30 degrees also and he says there's a bit sore sensation when down the lateral bending and when has bent forward or backward . . .

Here, *45 to 50 degrees* and *20 to 30 degrees* are interpretations added by Student 1 based on what she saw in the video. This kind of discourse did not occur for the paper trigger. The paper-trigger simply stated that "flexion movement [of the knee] was reduced because of pain," without further qualifications.

2. Do the communicative processes in which students identify and describe problems differently for paper-triggered and video-triggered PBL? How?

Question Asking

Students asked more questions in the video case than in the paper case. Table 3 shows the distribution of question types. A major difference between paper and video-triggered classes is that the latter asked more confirmation questions. Both groups asked very little justification-oriented questions thus the difference is not significant. They asked similar number of information-oriented questions.

Table 3. Question types and occurrence between two cases

Question type	Paper trigger	Video trigger
Confirmation questions	3	13
Information-oriented questions	6	7
Justification-oriented questions	1	3
Total	10	23

Table 4. Distribution of coding units at different levels of elaboration in paper-triggered and the video-trigger case

Levels of elaboration	Paper trigger	Video trigger
Information	90	122
Simple elaboration	5	16
Justified elaboration	27	68
Total	122	206

Levels of Elaboration

Table 4 shows the distribution of coding units at different levels of elaboration in paper-triggered and video-triggered cases, in their problem identification and problem description stages. The group produced 16 simple elaborations and 68 justified elaborations for the video case, and for the paper case, the group produced only 5 simple elaborations and 27 justified elaborations, showing that the same students and facilitator spent a large part of their discussion on elaborating problems associated with the video case.

3. How do students solve the problems together in paper-triggered and video-triggered PBL?

In this section, we provide examples on when and how students solve problem together by focusing on the process of building shared understanding. The group arrived at a diagnosis very early, at turn 9–10 in the paper case.

Student 2 (Turn 9): So seeing Mr. Ho is a 60-year-old man and he is having discomfort so maybe one of the differential diagnosis is osteoarthritis because at about 60 years old the prevalence of osteoarthritis increases tremendously. It is common for an old man to have osteoarthritis because he is also complaining of discomfort in both knees and the knees are weight bearing joint so that OA is more likely to happen in weight bearing joints.

Student 3 (Turn 10): Also because OA is a degenerative disease due to wear and tear and because Mr. Ho had to walk all the way up to his house and walk down again for the past 15 years so that the demand on his knees are much more than normal.

Student 2 suggested *osteoarthritis* as a differential diagnosis based on evidence presented in the patient history text: *60 year old man* and *having discomfort in both knees*. To justify the diagnosis, he also adds an explanation: *knees are weight bearing joint so the OA is more likely to happen in weight bearing joints*. Student 3 then adds a further explanation to help justify the diagnosis: *also because OA is degenerative disease due to wear and tear.*

In video case, the students did not make a differential diagnosis immediately after they identified the problem. Rather, they collaboratively elaborated and constructed a shared understanding of the major issues.

Student 4: Are there any more points you want to add? So if not then we can focus on the symptoms and list our hypothesis on the nature of this lower back pain and one thing special about it is it radiates to the thigh.
Student 1: And also is bilateral in the hips.
Student 4: Yes.
Student 5: How do we know that the radiation of pain is not the problem?
Student 4: So you suggest that could be the strain?
Student 5: No, We don't know yet.

Here the students construct a shared understanding of the nature and cause of the pain. Collaborative problem solving was more common in the video case, where students engaged in shared cognition earlier in order to build shared understandings. Initial diagnosis in the video case occurred at turn 27 as compared to turn 9–10 in paper case.

Student 4 (Turn 27): Yes so that can be separate symptoms of the same causes. I think, talking about the nature of the pain, if we suspect the same lesion that means if it is a radiation of pain to leg that it is like quite suggestive of nerve and neurological problem but one thing special is he has no numbness so if there is

any nerve compression or nerve injury that could cause numbness but he says he don't have it.

Although *nerve* and *neurological problem* were proposed as a tentative diagnosis, the patient's presentation did not contain enough evidence or explanations to justify it. Thus, other students added more hypotheses.

Student 6: Important for nerve or it should be more in bedtime than his walking for what I can understand this it's maybe also because there is some lesion on the muscle and the muscle compresses on the nerve causing the pain but when he is so painful when has walking so the muscle is . . .

Student 1: I am thinking that the doctor may be trying a differential diagnosis to see whether there is a possibility of bone tumor because as mentioned in the previous tutorial that carcinoma of bone may have pain exacerbating at night so that the doctor may be asking whether Mr. Poon feels more pain or not at night to try to see whether there is a possible cause.

Student 4: I am thinking whether the physician is trying to work out prostate cancer and metastasis to the . . .

Student 1: Because sometimes pain may be radiating to the back like the prostate cancer and also the colon and they are retroperitoneal so the pain actually may radiate to the back and it manifests as back pain.

Student 6 disagreed with the nerve problem diagnosis because Mr. Poon's pain occurs *more at bedtime than his walking*. Student 6 suggested that *pain during walking* could be caused by the muscle compressing the nerve. Student 1 then proposed the differential hypothesis of *bone tumor* based on the fact that the pain occurred at night. Since the pain did not occur at night, the student suggested that it was not a diagnosis. Student 4 proposed another differential diagnosis *prostate cancer metastasis,* which Student 1 further explained by saying that the pain from prostate cancer can radiate to the back.

The interaction above shows how the students collaborated on making diagnoses and differential diagnoses. Similar interactions occurred when students sought to eliminate differential diagnoses after watching the video of the physical examination. Such co-elaboration and co-construction occurred more frequently for video cases.

Discussion

At the cognitive level, the video and the paper conditions did not differ with respect to identifying information at the history taking stage, but did differ with respect to the physical exam stage. The reason could be that spoken discourse is easier to process than visual information and can be directly transformed into verbal communication. Signs revealed during the physical exam need to be verbally coded before they can be shared with others. The effort indicates that processing visual perceptions may require more information to construct useful interpretations. The video condition also called for more effort to describe the problem. One reason could be that information about the patient was not written down as in paper triggers. Students needed to interpret, explain, and elaborate information picked up from the video trigger in order to get other students in the group to understand the rationale behind how they described the problem. Under the paper condition the group tended to make simpler statements and claims, to engage in less co-construction and co-planning, and to produce fewer explanations and elaborations.

Similarly, at the communicative level, the video trigger elicited more confirmation questions and more simplified and elaborated justifications than the paper trigger. Students asked questions to seek information, justifications, and confirmations. Shared understandings are built through the question-answer process. Although, neither condition elicited many questions early in the problem solving process, the video condition elicited relatively more confirmation questions. As defined, seeking confirmation or affirmation implies the desire to build common understanding under the video condition (Lu, Lajoie, & Wiseman, 2010). Under this condition the group tended to provide their statements with more justifications. Qualitative data analysis corroborated the above descriptive findings and showed that the video condition called for more communicative effort to reach common understanding before making a diagnosis.

The study showed that presenting PBL clinical cases with text and video triggers led students to identify problems differently during the physical examination phase of the cases and to describe problems differently. Students asked more questions and produced more elaborations in building shared understandings of the problems when presented with video triggers. In doing so, they make their thoughts more explicit so that they could build the shared understandings of the problem that are so necessary for collaborative learning, problem solving, decision making, and the construction of shared knowledge.

The findings indicated that the video trigger led to more active communication. This could be due to the higher information content but lower specificity of the video cases. Students needed to spend more time seeking out salient information. It is difficult to claim that video triggers are more effective than paper triggers when what students need to focus on is recognizing the problem from concisely summarized and highly coherent information. However, given that video triggers are closer to real world scenarios, prolonged

discussion is needed for students learning, particularly in the early years of training.

The findings showed that the video-triggered case required more effort in socio-cognitive processes during collaborative PBL. Now the question is how such triggers help develop pattern recognition skills (Bransford et al., 1990), which are important for developing medical expertise (Lesgold et al., 1988; Schmidt & Boushuizen, 1993). Experts have better pattern recognition skills than novices and can make quick decisions given such skills. The current study suggests when using video triggers, it might take longer for students to build shared understandings before making diagnoses or reaching decisions. This finding poses a challenge to the efforts of facilitator to manage PBL effectively and efficiently. However, elaboration, co-construction, and justifying a diagnosis with evidence and explanation are very important problem solving skills that should be encouraged not only in PBL but in all learning processes (Hmelo-Silver & Barrows, 2008; Schmidt & Boushuizen, 1993). To this extent, video triggers for moderately or quite difficult cases may be beneficial to student learning. When introducing video-triggered PBL, attention should be paid to the balance of in-depth discussions and effective facilitation for leading students to examine issues pertaining to learning and problem solving. Video-triggered PBL may be more effective in helping students become members of professional knowledge constructing communities. Once students have developed pattern recognition skills using video triggers, they can use paper triggers to gain a better understanding of abstract descriptions of problems.

Conclusion

Since PBL was introduced 40 years ago, discussions of its effectiveness have been unable to arrive at definitive conclusions. A number of medical schools have incorporated PBL into their core curriculum and many others have adopted it to a lesser extent. Although reasons vary, the most important one seems to pertain to questions concerning whether or not PBL is superior to traditional methods of instruction. Similar questions confront the introduction of more authentic PBL—video-triggered PBL—into the curriculum. How are we to evaluate this new method and the kinds of differences it may introduce? This study compared video- and paper-triggered PBL from cognitive and communicative perspectives and found salient differences between them. The problem of translating these findings into concrete teaching practices naturally arises. Although the current study compares the learning processes of two PBL groups, the purpose is not to determine which method is superior as each one has specific strengths and weaknesses relative to different stages in the PBL process and years of training. We propose that video triggers be introduced with some scaffolding during the early years of medical school and that paper triggers be introduced in the later years. Given the effects of video triggers on how students elaborate and co-construct knowledge, we recommend using them during the earlier years when students need to spend more time identifying and defining medical problems in order to build up their understanding of basic and applied medial knowledge. In the later years of PBL training, when students have sufficient basic medical knowledge to equip them with quasi-expert pattern recognition problem solving skills, paper triggers can be used to provide students with chances to acquire clinical problem solving knowledge and clinical management skills.

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