

Advantages and Disadvantages of Problem-Based Learning from the Professional Perspective of Medical and Dental Faculty

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Abstract

The objective of this study was to explore and compare advantages and disadvantages of problem-based learning (PBL) from the professional perspective of medical and dental faculty. An electronic survey asked eighty-four medical faculty and ninety-four dental faculty (n = 178) to present their perspectives about PBL advantages and disadvantages. Medical and dental faculty presented comparable PBL advantages and disadvantages. Active learning, problem solving, peer-learning, critical thinking, self-learning, interactive learning, improved communication, and student engagement were themes reported by both groups. They also presented comparable disadvantages, including time constraints, inadequate resources, inconsistency in knowledge acquisition, required faculty training on PBL facilitation, and required student preparation and motivation.

Keywords: Problem-Based Learning (PBL); Professional Perspective; Medical and Dental Faculty

Introduction

Problem-based learning (PBL) is an instructional method that engages students and allows them to bring their individual assignments to the group for discussion, collaboration, and consensus [1]. This process is known as social constructivism, a critical framework for PBL. In PBL, knowledge is actively built by the learner; students are therefore not passive [2]. Students also seek and become active in scrutinizing and constructing knowledge. Furthermore, students face alternative viewpoints by interacting with other students in small groups, thus constructing new modes of learning [3,4].

PBL offers a great tool for students' self-instruction [5]. The behavioral theory on self-regulation includes students' self-instruction as well as their responsibility for an ongoing monitoring of their own progress. The social cognitive process constitutes both self-observation and self-judgment; learning both allows students to become active in their learning, especially when students are also conscious of their progress. This proves highly beneficial for students, as it encourages their critical thinking, imagination, and engagement [6,7].

As dental and medical students are adult learners, these skills are particularly valuable for their development, as they are expected to solve problems and become independent the more they progress throughout their education [8]. PBL contributes to developing such skills in several ways, as it asserts that learners form meaning and comprehension from their interactions both with others and through their experiences in an active learning mode [9].

In medical and dental education, there is a remarkable recent interest in student-centered instructional methods, which engage students and improve their independent learning and critical thinking. PBL offers a great tool in which students can develop independent thinking, cooperation skills, and improved communication [10]. PBL should thus remind medical and dental students of their roles as active rather than passive learners [11]. It should also remind faculty members of their roles as facilitators of the learning process for students [12].

PBL therefore enriches student learning and allows students to integrate their own experiences and knowledge into various clinical problems. It helps them to develop learning by creating hypotheses, asking questions, gathering evidence, and making decisions [13]. During this process, the burden of learning is placed on students, providing them with an environment to actively construct their knowledge by assessing and examining the evidence available [3]. In addition, because it is student-centered, PBL increases student motivation and desire to learn. Students are therefore more likely to become active in their learning within PBL [14]. In other words, PBL produces proficient clinicians and provides a tool for real-life problem solving, which is supported by both medical students and faculty [15].

In addition to these advantages, PBL strengthens cooperative learning skills. Working in small group context offers a great potential for strengthening students' communication skills [16]. Through PBL, knowledge is not only gained at individual level but also through group collaboration, thus constituting a social constructivist paradigm [17]. Physicians and dentists are increasingly expected to be not only professional, but also inter-professional. PBL provides a great teaching method in which medical and dental students' communication and collaboration skills are strengthened, and their preparation for future teamwork is enhanced.

PBL has the potential to be a significant replacement over traditional dental curricula [18,19]. Exposure to PBL results in better problem-solving skills, enhanced analytical thinking skills, and enhanced interpersonal attributes [20]. Further, it does not appear to have a negative effect on knowledge acquisition in dental education, and can improve students' abilities in applying their knowledge to clinical situations [21]. Additionally, dental students enjoy PBL sessions [18].

Whereas PBL advantages are documented in the literature, there is little investigation in the literature about the disadvantages of PBL, especially from the professional perspective of medical and dental faculty. Research and perspectives about PBL reported in the literature are largely positive. Therefore, an exploration of perspectives of medical and dental faculty about both advantages and disadvantages of PBL is needed. In addition, research has yet to make a comparison between these groups in this regard. Simultaneous assessment of perspectives of medical and dental faculty allows them to benefit from each other's perspectives.

Therefore, the objective of this study was to explore advantages and disadvantages of PBL from the professional perspective of medical and dental faculty. This study contributes to the literature of health care education by addressing an important learning method which, while having several advantages, also faces several challenges and inherent limitations.

Methods

To address the research question in this study, a survey instrument with two questions was delivered to collect qualitative data to reveal the perceptions of medical and dental faculty about PBL advantages and disadvantages.

Before conducting the study, a request to administer the survey was submitted to the Institutional Review Board at the University of Louisiana at Monroe. This project received an expedited review and qualified for exemption status. Participation in the survey was voluntary and anonymous.

Study participants were provided with a cover letter that includes information about the research project. Because some faculty may not be fully aware of what PBL entails, a brief definition was provided to study participants: In PBL, there are no or very few lectures; students learn by an inquiry method through exploration of patient health care problems in small groups guided by faculty facilitators;

students take responsibility for guiding their own learning and for teaching their peers. Faculty members function as “guide on the side” rather than “sage on the stage” [22].

Four demographic questions were presented to study participants. They were asked to a) self-identify as either medical or dental faculty, b) select their academic rank (Instructor, Assistant Professor, Associate Professor, or Professor), c) select whether they were in basic or clinical sciences, and d) select the number of years of teaching experience (0 - 5, 5 - 10, 10 - 15, 15 - 20, or 20+).

Two open, short, specific, and simple questions were presented in order to obtain qualitative data that address the study’s research questions. The two questions were as follows:

1. What are the advantages of PBL from your perspective?
2. What are the disadvantages of PBL from your perspective?

The survey instrument was validated by asking a panel of four faculty members with significant experience in survey construction to provide feedback on survey’s structure and wording, and was later pilot tested with six respondents who provided feedback on the survey as well. The survey was built as an electronic survey through SurveyMonkey (SurveyMonkey Inc., Palo Alto, CA). Invitation to participate in this study was sent to the administrations of participating institutions through an email, asking them to promote involvement in the survey by forwarding it to full time faculty who were engaged in medical or dental students’ education.

The administration in six medical and six dental schools in the U.S. forwarded the survey to their faculty. The following medical schools participated: State University of New York Upstate Medical University College of Medicine, Temple University School of Medicine, University of Cincinnati College of Medicine, University of Florida College of Medicine, University of Missouri School of Medicine, and Western University of Health Sciences College of Osteopathic Medicine of the Pacific. The following dental schools participated: Howard University College of Dentistry, New York University College of Dentistry, The University of Texas School of Dentistry at Houston, University of California, Los Angeles School of Dentistry, University of Illinois at Chicago College of Dentistry, and University of Washington School of Dentistry. These twelve public and private institutions are located in various geographic areas in the U.S. and vary in class size, research activity, and institutional age.

Responses were then coded to identify the overarching and common themes and subthemes presented by medical and dental faculty. All qualitative responses were analyzed and assigned codes where appropriate. Afterwards, qualitative themes emerged. Recurring themes were identified. After all qualitative data were coded in this manner, passages that shared common codes were organized and compared between and against medical and faculty responses.

Results

Eighty-four medical faculty and ninety-four dental faculty completed the two open-ended questions regarding advantages and disadvantages of PBL, with a response rate of 31%. Of these respondents, 7% were instructors, 26% were Assistant Professors, 32% were Associate Professors, and 35% were Professors. Basic sciences faculty comprised 37% of the study sample and clinical sciences faculty comprised 63%. Of these faculty participants, 13% had 0 - 5 years of teaching experience, 13% had 5 - 10 years, 16% had 10 - 15 years, 13% had 15 - 20 years, and 45% had over 20 years of teaching experience.

Table 1 presents the main advantages and disadvantages presented by both groups. Active learning, problem solving, peer-learning, critical thinking, self-learning, interactive learning, improved communication, and student engagement were the main PBL advantages reported by both groups. Both medical and dental faculty reported that PBL has the ability to link basic and clinical sciences, and enriches student learning experiences.

PBL Advantages presented by Medical Faculty	PBL Advantages presented by Dental Faculty
<ul style="list-style-type: none"> • Problem solving • Independent learning • Team work • Accountability and involvement • Active learning • Quality learning • Critical thinking • Interactive way of learning • Better perception 	<ul style="list-style-type: none"> • Problem solving • Independent learning • Team work • Communication skills • Active learning • Quality learning • Critical thinking • Integrated and interactive learning • Practical work
PBL disadvantages presented by Medical Faculty	PBL disadvantages presented by Dental Faculty
<ul style="list-style-type: none"> • Costs implication • Inadequate resources • Faculty intensive • Inconsistency • Highly individualism • Student resistance • Basic training • Inadequate clinicians • Affects students quality of learning and knowledge acquisition • Challenge when it comes to Evaluation 	<ul style="list-style-type: none"> • Costs implication • Inadequate resources • Faculty intensive • Inconsistency in knowledge acquisition • Inefficient approach Curriculum development • Basic training • Inadequate knowledge acquisition • Time consumption • Inadequate clinicians • Lack of structure

Table 1: Themes presented by medical and dental faculty about PBL advantages and disadvantages.

In addition to these advantages, one dental faculty mentioned that PBL “captures everyone’s attention,” and another faculty believed that it “has the potential to improve faculty and student interaction.” Another respondent believed that PBL initiates the learning process, and has the potential to improve the approach to patients and clinical skills, especially in the fourth year of dental school. Interestingly, one dental faculty argued that he or she found the medical cases in the medical curriculum to be more interesting than the ones in the dental curriculum. Another faculty stressed that the cases themselves have to be well selected, and if the PBL process is implemented properly, this method can teach students how not to repeat mistakes.

A number of disadvantages and concerns were voiced by both groups. Time constraints, lack of required faculty training on PBL facilitation, and required student preparation and motivation were main themes among both groups.

The most distinct concern about PBL, widely reported by both medical and dental faculty, revolves around using PBL alone as an instructional method. Several faculty expressed that a gap in knowledge can occur as a result of ignoring structured instruction. One medical faculty stated that PBL is “not appropriate for gaining systematic knowledge of a subject,” and another mentioned “holes left in the knowledge base would have to be filled by students later in their career.” Three dental faculty shared the comparable concern that PBL requires basic background knowledge before it should be implemented.

Several other concerns were voiced regarding logistical issues with PBL. For instance, one medical and two dental faculty reported that PBL is challenging to implement in large classes. Further, four medical and two dental faculty argued that PBL is faculty intensive and requires several facilitators for the small group discussions to function appropriately.

Discussion

PBL is clearly advantageous in several aspects. Most specifically, it promotes active learning, problem solving, peer-learning, critical thinking, improved communication, and student engagement. In addition, it creates interdisciplinary connections and links basic and clinical sciences [23]. This is a substantial advantage for students, because students generally acquire knowledge by scaffolding and relating new ideas and circumstances to their existing knowledge.

Not only can students learn and increase their knowledge base using this method, but they can also benefit from enhanced cognitive skills and higher-level thinking during PBL process, such as critical thinking. Demonstrating critical thinking in higher education is a competency that is widely desired by educators and administrators. PBL provides a significant opportunity for both medical and dental educators who desire to promote cognitive skills and higher-level thinking in their students.

Despite all these advantages, PBL has inherent limitations and disadvantages that cannot be overlooked. Well-prepared and effective PBL requires significant amount of time, and most medical and dental faculty are quite busy with myriad duties. Lack of required faculty training on PBL facilitation was reported as another significant concern in this study. This echoes a finding from a recently published study in which the professional development needs of faculty were explored in health sciences professions and the training on PBL was found to be an area of significant importance to faculty members [24].

Therefore, PBL can serve as a valuable adjunct to conventional teaching and lecturing [25]. It supplements the old ways of instruction such that students learn early in their careers that they should be responsible for their own learning. Every pedagogical method has limitations, and most limitations of PBL in fact exist across all methods of instruction, such as the requirement for time, resources, and faculty training on delivery of the pedagogical method [26]. Because students differ significantly, it is beneficial for them to be exposed to different pedagogical methods so that they get exposed to ideas and concepts during their education from all angles and in every possible way.

Conclusions

Within the limitations of this study, it can be concluded that perspective of medical and dental faculty about PBL advantages and disadvantages are congruent with the ones reported in the literature. In addition, their perspectives are largely similar about this teaching method. The similarity of perceptions between medical and dental faculty found in this study strengthens the versatile nature of PBL and demonstrates that it can provide a great tool for inter-professional education in medical and dental education if delivered effectively.

PBL requires effective preparation and delivery. Whereas some medical and dental faculty believe that it should be used as an adjunct to conventional teaching, others still prefer the old ways of teaching.

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