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Problem-based learning in dentistry: learner satisfaction survey

Cover Page Footnote

Thanks to the students of 2nd year of dental medicine at the Mohammed VI University of Health Sciences for their participation in this scientific work.

RESEARCH ARTICLE

Problem-Based Learning in Dentistry: Learner Satisfaction Survey

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Abstract

Background: Problem-based learning (PBL) is an active pedagogical approach based on self-directed learning that promotes knowledge retention and improves educational performance.

Materials and methods: We have undertaken a first introduction of the PBL in conservative dentistry, with 91 volunteer students out of a total of 119 students in the 2nd year of dentistry at the Mohamed VI university of sciences and health (UM6SS). The session was ended by a satisfaction survey through an anonymous and voluntary questionnaire with 4-level Likert scale. The descriptive statistical analysis was performed using SPSS version 23 software.

Result: Students greatly appreciated the general concept of the PBL giving it a score of 3.4/4, the scientific interest of the sessions and their pedagogical value were also highly appreciated by the students with scores of 3.4/4 and 3.1/4 respectively, while the organization and conduct of the sessions received a score of 3.2/4.

Conclusion: All of the participating students expressed the wish that PBL be included in their training program.

Keywords: Problem-based learning, Dentistry, Health sciences education

1. Introduction

Modern dental education must provide students with theoretical knowledge and practical skills and must encourage critical thinking and a quest for knowledge throughout life in order to better manage clinical situations [1,2]. Problem-based learning (PBL) can meet these requirements for active, self-motivated and dynamic education [1,3]. PBL has been introduced into health sciences education at McMaster University in 1969 by Barrows and Tamblyna was first introduced into dental education at the Faculty of Dentistry at Malmö in Sweden, in 1990 [2].

Problem-based learning is an active learning strategy of high taxonomic level that reactivates previous knowledge and allows the acquisition of new knowledge through the discussion in small groups of students from the different of explanatory hypotheses in the face of clinical problem, it thus

sharpens the learner's critical thinking skills who becomes an actor in his own learning. The teacher-facilitator guides and directs the students to reach the learning objectives [1,3]. However, traditional teaching does not stimulate the interest of students and does not cultivate the clinical thinking that allows them to analyze and solve a contextualized problem situation.

Although its development may vary according to the different contexts, the PBL consists of three phases: a phase of presentation and analysis of the problems, a phase of solution finding and self-directed learning, and a phase of synthesis and general assessment [4–6].

As a basic branch of dental education, conservative dentistry is of great importance to dental students because it requires theoretical knowledge and practical skills and clinical competence. The purpose of teaching conservative dentistry is to improve students' clinical thinking skills and the application of theoretical knowledge to solve practical

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problems. Traditional teaching does not stimulate students' interest and does not cultivate in them the clinical thinking that enables them to analyse and resolve a contextualised problem situation [7]. The aim of this work is to evaluate the students' satisfaction after a first experience of introducing the PBL in conservative dentistry.

2. Material and methods

This is a cross-sectional epidemiological study carried out in the Faculty of Dentistry at UM6SS in April 2022. A first introduction of the PBL method in conservative dentistry was carried out and all the students of the 2nd year were invited to participate in it. A single teacher-facilitator was in charge of animating and guiding the different PBL sessions.

An informative session was dedicated to the briefing and explanation of the PBL concept, the constitution of sub-groups of 5 students, the distribution of roles (tutor, facilitator, secretary, time keeper), then the different phases of the PBL were put into practice during 3 sessions of 1 h and 30 min per group. Thus, a clinical vignette exposing an authentic clinical problem was presented to the learners and then analyzed in order to answer the learners' questions in a progressive manner. After defining the problem to be solved, explanatory hypotheses were formulated. The learners were invited to solve the problem and verify the hypotheses by self-learning through bibliographic research. In the presence of the teacher facilitator, the proposed solutions were then shared in a climate of discussion and communication.

Our PBL session ended with an evaluation of the satisfaction of the first level of Kirkpatrick where only the learners who participated in this sessions were included. Thus, an anonymous and voluntary self-administered questionnaire was developed based on from a literature review [8,9]. It was pre-tested with the department's interns in order to verify its comprehension and to evaluate the time required to complete it. We opted for a paper questionnaire with 20 closed questions covering 5 areas: the organization of the session, the scientific interest, the pedagogical value, the course of the session, the general appreciation of the PBL by evaluating the learners' appreciation by a Likert scale with 4 levels 1: not satisfied; 2: not very satisfied; 3: satisfied; 4: very satisfied.

The questionnaires were distributed to the different groups at the end of the PBL session and were collected immediately. The descriptive statistical analysis was performed using SPSS software version 23.0.

Ethical considerations: All participants were informed about the objectives of the study, consent was obtained from all students included in this study, their participation was voluntary without any direct or indirect benefit. The anonymity, respect of privacy and confidentiality of the data were guaranteed to the participants.

3. Result

The number of students participating in the BLP was 91 out of a total of 119 students enrolled of which 78 were women and 41 men. The average age of the students was 19 years. We discarded one incomplete questionnaire, giving a response rate of 75.63%. For all the learners, this was their first experience of problem-based learning. These students greatly appreciated the general concept of PBL, giving it a score of 3.4/4, i.e. a satisfaction rate of 87.69%. The scientific interest of the sessions and their pedagogical value also aroused their satisfaction by giving them a score of 3.4/4 and 3.1/4 respectively, which a satisfaction rate is respectively 87.2% and 77.1%; while the organization and conduct of the sessions received a score of 3.2 and 3.19/4, i.e., a satisfaction rate of 82.47% and 81.72% respectively. The results are detailed in [Figs. 1 and 2](#).

4. Discussion

Today's dental students will be tomorrow's practitioners and will be confronted with a professional environment in rapid and continuous evolution. Their professional performance depends on their theoretical, practical and clinical thinking skills. Problem-based learning is part of this process. It's an educational strategy that stimulates active self-directed learning by using clinical problems to encourage learners to identify and apply research concepts and to relate the information collected to solve the clinical situation presented [9].

Several studies focused on different fields of health sciences (medicine, dental, pharmacy, paramedical) have shown that PBL was classified in the category of educational tools with positive impact on learners in terms of academic success and acquisition of new skills and that it significantly outperformed traditional teaching methods (lectures, directed teaching) [7,10–13]. Thus, PBL by ensuring a high score of skills and knowledge acquisition allows to improve the creativity of the learners, to favor the metacognitive reflection, clinical reasoning and decision making; to facilitate case analysis by immersion in a work situation and by reducing the gap between theory and practice. In addition, small

ITEMS	1: not satisfied	2: not very satisfied	3: satisfied	4: very satisfied
Organization	2,72 %	14,72%	41,92%	40,55 %
Scientific interest	1,65%	11,1%	30,55%	56,65 %
Pedagogical value	5,5%	20,55%	35,4%	41,7%
The Course of the session	2,57%	15,66%	41,86 %	39,86%
General assessment	1,46%	10,73%	37,36%	50,33%

Fig. 1. Summary assessment of student satisfaction.

group learning enhances communication, social interaction and cooperative learning and allows the student to be an active and autonomous learner throughout the professional life, even after graduation [1–4,9,10,14–19]. PBL as an advanced cognitive activity ensures the student to retain knowledge better and to recall it more easily at the appropriate time [11,16,17]. It promotes engagement and perseverance and contributes to a greater degree of learner motivation [6,12]. All these properties encouraged us to introduce PBL in our department as the first nationwide experiment in conservative dentistry.

The evaluation of an education provides information about the level of achievement of the educational objectives, and analyzes the quality of teaching and learning in order to validate the educational process. Kirkpatrick's model classifies the effectiveness of the educational intervention into four levels (Fig. 3). According to the first level of Kirkpatrick's model, training is effective if it provokes a good reaction from the learner and a high level of satisfaction (>80%), which is in line with the results of our study, which resulted in a satisfaction rate of 87.69% for the appreciation of the general concept of PBL, a rate of 87% for the scientific

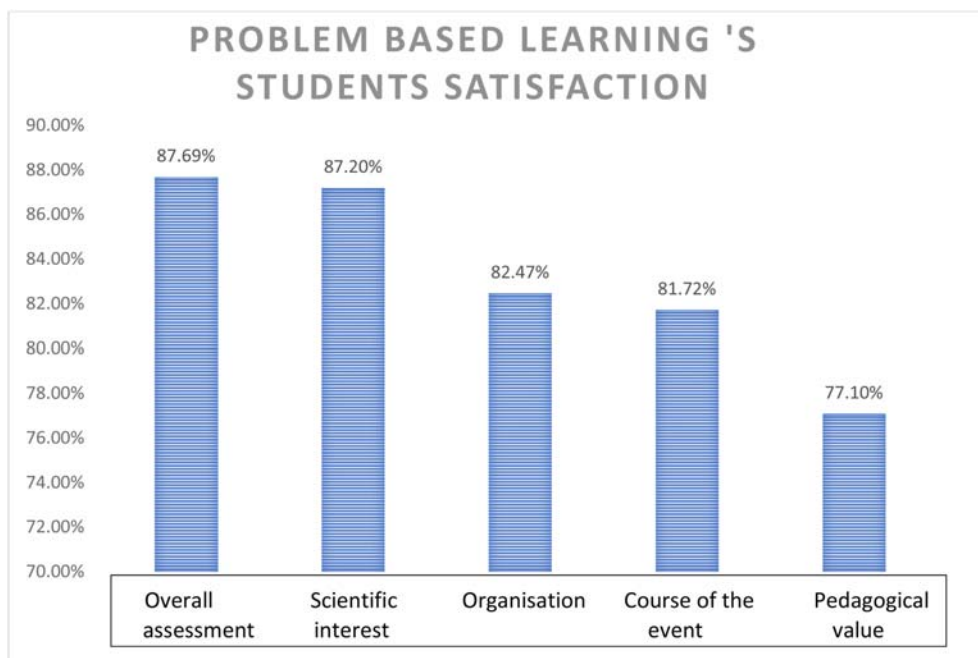


Fig. 2. Summary graph of student satisfaction.

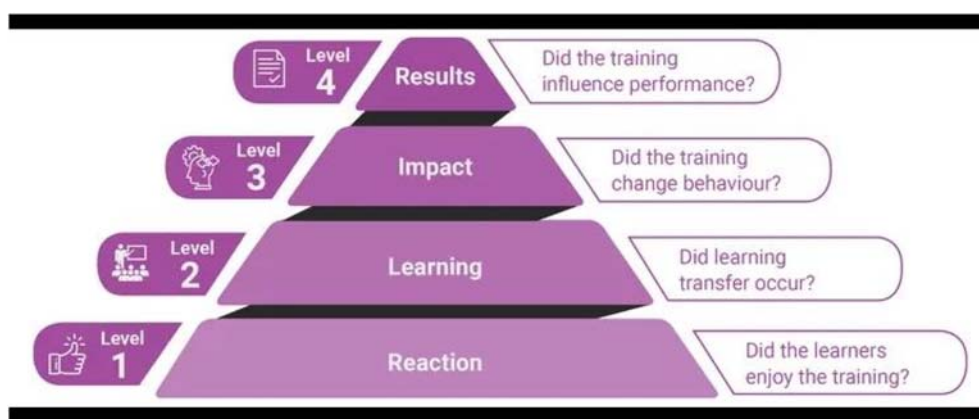


Fig. 3. Kirkpatrick's evaluation model [25].

interest, a percentage of 82.47% for the organization and 81.72% for the conduct of the session. Only the pedagogical value did not reach a high level of satisfaction, close to 77.1%, which can be explained by the belief of some students that the teacher's job is to transmit knowledge without their active participation [18].

These results of a high level of satisfaction and positive perception of teaching by problem solving corroborate the results found in the literature on PBL with the following key elements for the success of this approach: small group size, use of real clinical cases and good management of group dynamics [7–9,11,12,17,19–22,24]. This full satisfaction of the learners can be explained on the one hand by the new role of the teacher as a facilitator who leads, gives the lead of the discussion and make it productive and focused [4,20,23].

The success of PBL is therefore conditioned by the training and practice of tutors who play four key roles: coaching, scaffolding, modeling and gradual withdrawal [7]. The debriefing presented to the larger group allows students to receive often positive feedback and to learn from their mistakes as well as to build their confidence which makes the perception of PBL positive and enjoyable [10,11].

The limitation of our study is that we only assessed the first tier of Kirkpatrick's model. Other levels can be examined at a later date, when PBL is integrated into the training of students over several years, in order to assess the real changes in the students' behaviors and attitudes, the transfer and integration of learning, and the impact on patient management. Its strengths are multiple; to our knowledge, it is the first introduction of problem-based learning in conservative dentistry on a national scale. Moreover, the results of the satisfaction survey are encouraging and the success rate of

students after courses in PBL, reported by the tutor, is better compared to lectures, this incites us to develop more PBL sessions for courses that lend themselves to it.

5. Conclusion

The development of problem-based learning sessions is a complex process that requires an investment of time and trained teaching staff but PBL is an active learning process that allows the development of high-level cognitive correlating theoretical and clinical performance with the acquisition of skills needed in the professional world.

Authors' contributions

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript and provided approval for this final revised version.

Conflict of interest

The authors declare no competing interests.

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