Active methodologies as pedagogic strategy to promote teaching-learning in Dentistry: report of experience

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ABSTRACT

Traditionally, teaching and learning of Dentistry courses in Brazil have focused on the development of scientific knowledge and technical skills inherent to the profession. However, when considering the demands of today's society, the importance of providing undergraduate Dentistry students with integral, holistic, and competence-based training that goes beyond the profession's technical requirements becomes clear. This article reports the experience of applying active methodologies, including playful activities, as a pedagogic strategy for the promotion of teaching and learning, based on competence-based training, in the Stomatology course at the Dental School of the Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, Brazil. According to undergraduate students' reports, it was concluded that such active methodologies could be used as a complementary pedagogic strategy for teaching and learning in Dentistry.

Descriptors: Teaching. Learning. Dentistry.

1 INTRODUCTION

In Brazil, the teaching and learning process has traditionally been based on the theory of transmissibility, or the simple transmission of information. In “traditional teaching,” which is based on this theory of education, teachers use lectures to transmit information to students, making learning a passive exercise[1,2]. However, the field of higher education in Brazil has been struggling for some time to keep up with societal changes. Currently, it is understood that "the learning process" can happen in different ways, for example, individually, in groups, by means of interchange, etc[3]. Araújo and Mazur (2013)[2] have emphasized that traditional teaching is associated with outcomes such as student evasion, mechanical learning, and, by the beginning of high school, demotivation.

Recently, increasing attention is being paid to the promotion of new pedagogic strategies, especially active methodologies, in teaching and learning. This means a search for teaching methods that allow greater involvement of professors and students in order to enhance the teaching and learning process, especially for any kind of educational method that makes the students actively involved in the learning process[4]. In this active learning process, students build “competences” and think about what they are doing as protagonists. Spricigo (2014)[6] has emphasized that engaging a student in real situations in class brings the student closer to the practical application of scientific knowledge, promoting the learning and skills to solve real problems, allowing decision-making, improving discussion abilities, and promoting work-team action. Still, active learning is often understood as an "educational fashion" by some groups of professors and students, which raises questions about the real meaning of active learning.

Faced with this new reality, some educational institutions have adopted active methodologies as a new strategy to promote teaching and learning[7], including the training of professors and students together. Although this subject is being discussed throughout Brazil today, it is important to highlight that the University of Brasilia may have been one of the first universities in the world to apply a non-conventional teaching and learning approach through Problem Based Learning (PBL). The University of Brasilia was founded in 1960 and started teaching methods in 1962; among its main characteristics are finding quick solutions to problems, interdisciplinarity, experimentation, integration of research and teaching, and collaboration with society[8].

Formal dental education in Brazil began in 1879 with the introduction of the so-called "Dental Surgery" course, which was initially taught in medical schools. The Brazilian Emperor, Dom Pedro II, formalized by decree Dentistry as a profession in 1884, and the first "Dentistry Courses" were created in the medical schools in Rio de Janeiro and Bahia. Parallel to this development, Dentistry was also established as a profession in Europe and the United States in 1900[9]. Then, in 1911, the "Dental Technique" course was introduced in Brazil, which made it possible to train on mannequins, a breakthrough in the technical aspects of dental education that has lasted up to the present day. As early as 1919, Dentistry schools in Brazil developed into four-year programs with an emphasis on knowledge in Biology. In 1933, Brazilian dental schools became autonomous, initiating a new era of undergraduate and specialization graduate courses. Currently, Dentistry in Brazil is still progressing as a result of the 1996 Guidelines and Bases Law and the National Curricular Guidelines of 2002[10,11].

Dental schools in Brazil, as well as other higher education programs, have sought to evolve pedagogically in the face of new methods of teaching and learning and, to this end, they are rebuilding their curricular grades, providing the opportunity to apply active methodologies. However, Dental courses that emphasize technicism are still taught, as technicism is essential to the full development of a dental surgeon's professional skills[12].

In fact, the development of technical skills is an essential aspect of the training of future dental surgeons. Without these skills, dentists would not be able to practice interventional and therapeutic Dentistry. In this context, the pedagogy of conditioning and technicist, which is based on behaviorist learning theory's aim toward effecting behavioral changes in the student[13], is still widely used for the development of the technical skills essential to Dentistry.

However, parallel to this aspect of undergraduate Dentistry courses, there is also a growing need for programs to adopt new teaching methodologies that seek to integrate theory and practice, teaching/service, and skills development. Based on the above information, the basic question is: To what extent is the field of Dentistry able to adapt its teaching and learning process, a process that has, until now, been based predominantly on the teaching of technical skills, in order to train professionals who are able to handle the demands of today's more informed and multifaceted (in terms of needs) society?

This article aims to report the experience of applying active methodologies, including playful activities, as a pedagogic strategy for the promotion of teaching and learning, based on competence-based training, in the Stomatology course at the Dental School of the Pontifícia Universidade Católica do Paraná (PUCPR), Curitiba, Brazil.

2 REPORT OF EXPERIENCE

The present report of experience is the result of the professor training project, managed by the Centro de Ensino e Aprendizagem (CrEARE) of PUCPR, which was founded and promoted by the Agência Financiadora de Inovação e Pesquisa (FINEP) between 2017 and 2019.

This is a descriptive report involving the Stomatology course at the Dental School of PUCPR as a scenario of experience during the first and second semesters of 2018. The course comprises theoretical and practical lectures during the 7th period of the Dental School program, consisting of 72 academic hours in total. On average, 45 students are enrolled per semester; currently, exchange students from Colombia, Bolivia, Chile, and Belgium are also enrolled in the course.

The theoretical section, which is comprised of two consecutive lectures, is taught in the classroom, and the practical section, which is related to patient care and is also comprised of two consecutive lectures, takes place in the Dental Clinic of PUCPR. During the two semesters of 2018, the application of active methodologies was carried out by dividing the students' tasks in groups (Team Based Learning: TBL). Using a structured questionnaire answered by the students at the beginning of the semester, the senior professor planned and organized the activities prior to class in order to integrate the different mind-sets that enable the process of teaching and learning[14].

The professor's experience using playful activities during the first and second semesters of 2018 in order to meet the learning outcomes goal of the Stomatology course is described as follows.

First day of lecture

The senior professor began the first lecture of the semester by projecting an image of mountain climbers at the beginning of their climb, comparing this situation with that of the Stomatology course. Then, the professor raised the students' awareness by highlighting the fact that, to reach the final goal (in this case, the successful completion of the course), collaborative work between students and professors will be essential.

In addition, the professor explained that Dentistry encompasses more than such diseases as caries and periodontitis; as a health professional, the dental surgeon has a great responsibility to identify oral and/or systemic alterations such as cancer, AIDS, autoimmune diseases, diabetes, and sexually transmitted diseases such as HPV and syphilis, and even to identify patients with a higher risk of cardiovascular disease.

The adverse effects of systemic medications on oral health are also highly relevant in this context. Therefore, the student of Dentistry should be aware that the patient cannot be reduced to a mere "procedure" and that the improvement of hands skills, although fundamental for a dental surgeon, is not by itself enough to care for patients in a whole, integral, and humanized way.

After introducing this preliminary awareness to the classroom, the professor presented her history and background, including images of her professional activity from the time of her academic period to the present day, which had a positive impact on the students.

Next, all students were organized into groups for the following interactive task. Students were challenged to use the seven pieces of the Chinese Tangram puzzle to build an image provided by the professor. The team that solved the challenge the fastest would receive a "reward" as recognition. The result was better than expected, as the students laughed, joked, and shouted, integrating themselves as a team. Even the exchange students were motivated to participate in the teams and gave their opinions and experiences from their own countries. Based on this "gamification" method and on each team's reported feedback, the Stomatology course was contextualized and its business market insertion was discussed. Moreover, the teamwork activity promoted the competence of working in an interdisciplinary context.[5]

The initial outcome that resulted from using this methodology each semester in the first contact between the professor and her students showed good student receptivity as well as engagement to carry out the proposed activity. In addition, at the end of the lecture, the senior professor was surprised by one student, who stayed to speak with her after everyone else had left the classroom. The student said:

> *"Professor, what kind of class was this? Many of my colleagues are not aware that it is very important to give feedback to the professor about the activities carried out. But I do think it's important and I'm here to tell you that I've never had such a good and stimulating lecture. Of course, I have a lot of affinity for this subject, but I was very motivated and enthusiastic about the current semester in Stomatology, which has awakened even more in me the desire to follow this area. So, professor, I am willing to do any type of work for the course: presentation of work, internship, clinical case, helping you whenever it is needed."*
>
> Student 1

Case study activity

Another planned activity was a case study, which had been explained previously by the senior professor. The objective of this activity was to achieve the second learning outcome (LO 2), which was to elaborate the clinical diagnosis of pathologic oral alterations based on data from an extrabuccal and intraoral clinical examination, followed by complementary exams.

For satisfactory completion of this activity, however, students needed to apply their previously obtained knowledge to the first learning outcome (LO 1), which was to analyze oral alterations and the impact of social, psychological, and health factors on the patient's oral health while also identifying anatomical variants, pathological lesions, and the risk of systemic repercussions.

The case study activity took place during the two weeks of theoretical lectures and included the professor's formative evaluation of the activity and immediate feedback given to students on both the first day, when students were divided into small groups, and on the second day, when all students were a part of one big group.

The case study was carried out in two stages by the students, who worked in their original small groups. During the first week, the students studied and discussed a clinical case in which a patient complained of xerostomia, the rationale for which was based on information from the patient's anamnesis and from an extra- and intrabuccal physical examination.

At the end of the first day, each small group built a mind map showing the correlation and developing the competence of interdisciplinary critical thinking (Figure 1).[5] During the activity, the professor was able to assist the small groups, giving them immediate feedback based on what each group was discussing and producing.

At the beginning of the second day of the case study activity, the professor asked that a reporter from each group, randomly chosen, briefly explain to the class as a whole the rationale line used by his or her group, which led to the formative evaluation of the first stage of the activity.

During each group's explanation, the professor gave immediate feedback to all students that emphasized the main aspects highlighted by each group. In addition, the senior professor facilitated discussion between the groups in order to help them reach the activity's final objective, while highlighting the different ways to conduct the case in question.

At the end of all the presentations, the professor explained the theoretical foundation of the study, emphasizing the clinical rationale used to conduct the case in question, which, although integrating different aspects, was related to the main theme of hyposalivation. The professor finished the lecture with a final explanatory slide and then proposed that students engage in a dynamic/experience. To illustrate the guidelines that should be given to patients with hyposalivation, she invited students to taste salivary flow stimulants, such as lemon and citric fruits, as well as artificial saliva, which was unknown to most students. Students responded to this activity as follows.

> *"I loved the activity, I learned much more than a traditional lecture. At the beginning of the activity I felt some difficulty because I did not know how to start it, but with the development of the case I remembered many things. In addition, the finalization of the activity concluded the clinical case perfectly."*
> Student 2

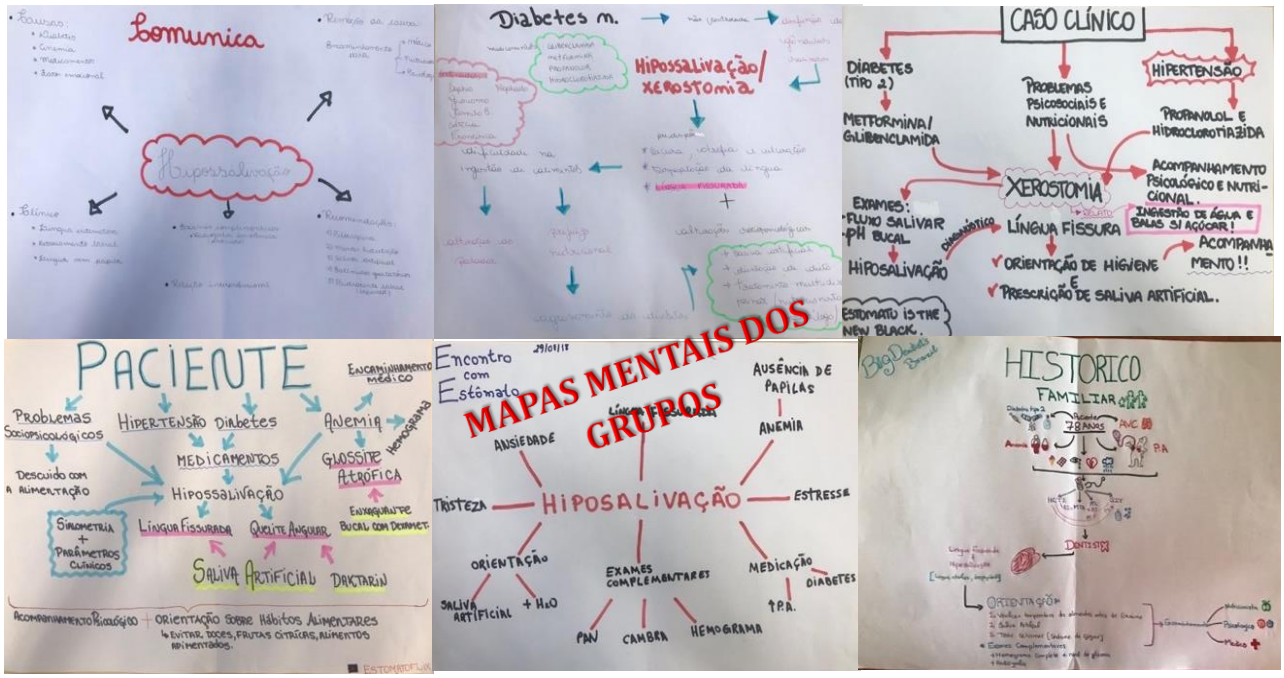

Figure 1. Examples of mind maps produced by the small groups.

"The activity performed in the classroom was very interesting and the way it was done stimulated us to search scientific articles and to learn more than a traditional lecture filled with slides. The lectures were dynamic and very productive."

Student 3

"I thought the lecture very productive since the moment it was proposed to do the research on the topic of the clinical case and, after, to assemble a flow chart. I believe that this type of lecture/activity corresponds to the need for knowledge that we students are searching for, especially for clinical practice. Congratulations professor!"

Student 4

"The activity was very productive and with excellent application of the active methodology. Congratulations!"

Student 5

"I thought the full activity was just wonderful. Actually, I thought that I was not going to learn a lot; I always talked about diabetes, anemia, but I never really understood how medications could affect the clinical outcomes. Today, for the first time, I had not only the knowledge of the subject as I understood it; I know that I will not forget it because I learned through the experience and not only by using memory. What I most loved was to try artificial saliva. I thought it was different. Thank you very much for the opportunity to learn based on experience. I loved the lecture!"

Interchange Student (Colombia)

"I was fascinated with the lecture. I really enjoyed the activity and also the sequence of the lecture; I think it's a way of sharing group knowledge and learning from different points of view. The clinical case presented was very interesting. I learned how to handle and

manage the patient in the best way possible as a future dentist. Congratulations professor for all lectures and for your dedication and engagement."

Interchange Student (Peru)

Play-word activity (Flipped Classroom)

The aim of this activity was for students to apply their previously obtained knowledge to the preparatory activity, performed in an virtual extra class environment. For this activity, students were required to study an assigned book chapter individually, with the main objective of providing a theoretical basis for the professor's upcoming lecture. The activity's study topics were related to achieving learning outcome 3 (LO 3): to establish treatment guidelines for pathological oral alterations, according to both clinical diagnosis and an individual patient's needs, and to promote oral health.

This playful activity, which was based on the preparatory activity and explained to students by a senior professor, was a word-find in which students were asked to find the eight main extra- and intrabuccal adverse effects related to antineoplastic treatment. The group that solved this activity in the shortest time would receive an "award."

The word-find appeared to be difficult for the students who had not fully understood the preparatory activity because they did not know which words to search for. In order to prevent such a situation, the professor had prepared supportive complementary material, which was given to that specific group of students after the first eight minutes of the activity. At this point, the students promptly began to study all the material, without noticing that they were studying and discussing information that could be found out using the word-find playful activity.

The effect of this activity was very noticeable because the students got familiar with the theme and because they found the extra class activity to be "different and surprising," as they reported to the professor. After the initial activity, the professor focused on the lecture's theoretical basis, and therefore the discussion of clinical cases called on students' active attention and participation. The questions raised by students were very appropriate, and the objectives related to the proposed learning outcome were clearly achieved.

In addition, the discussion of individualized cases that, according to the students' own vision, seemed unlikely in a real context, helped them to see the field of Dentistry, and, even more, to understand it, from a broader, more humanized perspective in which professionals are responsible for providing integral and individualized care of the human being. Once again, students developed the skills to work in an interdisciplinary way and to think critically.[5]

Students used structured questionnaires to evaluate some activities, such as those related to learning outcome 3 (LO 3), during the semester. Students also evaluated the Stomatology course following the application of active methodologies. The following testimonies were written by students in response to the questionnaires:

"I believe that the active methodology has contributed to my knowledge. With my group of colleagues I was able to share ideas and discussion on certain subjects. In addition, the proposed activities motivated me to study more at home about the themes that the professor proposed."

Student 6

"I can express that my experience during the lectures showed me how important it is to maintain a dialogue between the students and the professor, because it opens a discussion about the subject in which it is possible to extract more information and thus to acquire more learning. Because of the active methodology, groups of students with different views on the same subject were made to interact, and, at the end, there was more rational thinking around the subject. Besides, all discussions and discussion were previously explained, providing the right direction. I think that this method of teaching helps the student to get more knowledge and rather than to get one-way lectures in which the professor speaks and the student copies. It is clear that the old method in which professors only speak is obsolete. As an academic of Dentistry, I recognize that active methodology not only teaches us, but also motivates us to search for knowledge in the future to be a more qualified professional."

Student 7

"I believe that the active methodologies used by Stomatology have contributed to the increase of my knowledge, because with open discussion with my colleagues and the different activities, I was more enthusiastic and willing to study deeply in different subjects."

Student 8

3 FINAL CONSIDERATIONS

In courses such as Stomatology, the development of competence-based training that focuses on logical rationale, critical thinking, interdisciplinarity, communication, and holistic patient care is fundamental to the achievement of learning outcomes by undergraduate students in Dentistry. In this context, active methodologies are fundamental tools throughout the teaching and learning process.

In order to fully achieve the objectives of this pedagogic method, it is important that professors are trained and that students receive their institution's guidance. Moreover, investments in classrooms are extremely necessary, including investments in physical structure, sound and image technologies, and specific materials.

Still, it is necessary to consider the other relevant aspects that make this process succeed. For example, the ratio of students to professor is relevant, since the stages of active methodologies activities always start outside the classroom with the planning of an activity, preparation of materials, and many extra class preparatory activities, all of which need feedback. Moreover, the other stages, which are carried out in the classroom, demand from the professor, who must also take into account individual or group outcomes, a lot of attention to and skill in guiding students.

For teaching and learning based on competencies in Dentistry to be feasible, it is important that the curricular grade be structured to provide this type of training. In other words, planning must be based on institutional leadership, with an emphasis on the professional responsibility of dentists to the business market in which the future needs of society must be met, rather than on a concern that course content be only "transmitted to convey information to students." Moreover, a curriculum that allows students to progress at different speeds in relation to their classmates while respecting the individuality of each one is mandatory. Finally, in an effort to approximate laboratory and clinical experience, such a curriculum requires a horizontal structure through which students progress by way of hierarchically organized skill levels and according to the degree of difficulty. In this context, the application of active teaching and learning methodologies is fundamental to encouraging undergraduate Dentistry students to actively participate in class and to enable them to

become the protagonists of their own education[15].

RESUMO

Metodologias ativas como estratégia pedagógica para promoção do ensino-aprendizagem em Odontologia: relato de experiência

Ao longo da história, o ensino e o aprendizado nos Cursos de Odontologia no Brasil vem sendo exercidos com ênfase no desenvolvimento de conhecimentos científicos e habilidades técnicas que são indispensáveis para a profissão. Porém, considerando-se as atuais necessidades apresentadas pela sociedade moderna, a importância em propiciar ao estudante de graduação em Odontologia uma formação integral, holística e baseada em competências, que vão além do tecnicismo, torna-se emergente. O presente artigo tem como objetivo relatar a experiência da utilização de metodologias ativas, com atividades lúdicas, como estratégia pedagógica para a promoção do ensino-aprendizagem, baseada em competências, na disciplina de Estomatologia, do Curso de Odontologia, da Pontifícia Universidade Católica do Paraná. De acordo com os relatos apresentados pelos estudantes desta disciplina, conclui-se que as metodologias ativas podem ser utilizadas como estratégia pedagógica complementar para o ensino e aprendizagem em Odontologia.

Descritores: Ensino. Aprendizado. Odontologia.

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REFERENCES

1. Valente, JA. Blended learning e as mudanças no ensino superior: a proposta da sala de aula invertida. Educar 2014; Edição especial (4):79-97.
2. Araújo, IS; Mazur, E. Instrução pelos colegas e ensino sob medida: uma proposta para o engajamento dos alunos no processo de ensino-aprendizagem de Física. Cad Bras Ens Fís. 2013; 30(2):362-84.
3. Morán, J. Mudando a educação com metodologias ativas. 2015 Coleção Mídias Contemporâneas. Convergências Midiá-ticas, Educação e Cidadania: aproximações jovens. Vol. II.
4. Prince, M. Does active learning work? A review of research. J Engr Education. 2004; 93(3):223-31.
5. Competencies for the New General Dentist (As approved by the 2008 ADEA House of Delegates). J Dent Educ 2011, 75(7), 932-935.
6. Spricigo, CB. Estudo de caso como abordagem de ensino. Pontifícia Universidade Católica do Paraná, 2014. [Cited Dec. 20, 2018]. Available at: https://www.pucpr.br/wp-content/uploads/2017/10/estudo-de-caso-como-abordagem-de-ensino.pdf
7. Rocha, EF. Metodologias ativas: um desafio além das quatro paredes da sala de aula. 2012. [Cited Dec. 20, 2018]. Available at: http://www.abed.org.br/arquivos/Metodologias_Ativas_alem_da_sala_de_aula_Enilton_Rocha.pdf
8. Dahms, ML. Problem based learning in engineering education. Pontifícia Universidade Católica do Paraná, 2018. [Cited Dec. 20, 2018]. Available at: https://www.pucpr.br/wp-content/uploads/2017/10/artigo-pbl.pdf
9. Almeida, ECS; Venúscolo, DMS; Júnior, WM. A conformação da Odontologia enquanto profissão: uma revisão bibliográfica. RBO. 2002; 59(6):370-3.
10. Saliba, NA; Moimaz, SA; Garbin, CA; Diniz, DG. Dentistry in Brazil: its history

and cirrent trends. J Dent Educ. 2009; 73(2):225-31.
11. Scavuzzi, AIF; Gouveia, CVD; Carcereri, DL; Veeck, EB; Ranali, J; Costa, LJ; Morita, MC; Araújo, ME. Rev ABENO. 2015; 15(3):109-13.
12. Queiroz, MG; Dourado, LF. Ensino da Odontologia no Brasil: uma leitura com base nas recomendações e nos encontros internacionais da década de 1960. Histo Ciênc Saúde. Manguinhos. 2009; 16(4):1011-26.
13. Veiga, IPA (Org). Técnicas de ensino: por que não? 21ed. Campinas, SP: Papirus, 2011.
14. Kibble, JD; Bellew, C; Asmar, A; Barkley, L. Team-based learning in large enrollment classes. Adv Physiol Educ. 2016; 40: 435-42.
15. William, D; Hendricson, WD; Cohen PA. Future directions in dental school curriculum, teaching, and learning. American Association of Dental Schools. 75th Anniversary Summit Conference, p. 1-25.

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