

## **TEAM BASED LEARNING: APPLICATION OF ACTIVE TEACHING METHODOLOGY AS EVALUATION IN THE PRE-CLINICAL MOMENT IN THE DENTISTRY COURSE**

***TEAM BASED LEARNING: APLICAÇÃO DE METODOLOGIA ATIVA DE ENSINO COMO AVALIAÇÃO NO MOMENTO PRÉ CLÍNICO NO CURSO DE ODONTOLOGIA***

***TEAM BASED LEARNING: APLICACIÓN DE LA METODOLOGÍA DE ENSEÑANZA ACTIVA COMO EVALUACIÓN PRECLÍNICA EN EL CURSO DE ODONTOLOGÍA***

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**ABSTRACT:** The teaching of dentistry begins with isolated disciplines of each area. In the final semesters, the Integrated Clinic occurs, where the fragmented learning is unified. Thus, the objective of this work, of qualitative approach, encompasses the description, planning, execution and development of concepts related to disciplines of the Dentistry course, using Team Based Learning (TBL) as an Active Teaching-Learning Methodology. Students in their eighth period, in their first contact with the discipline of Integrated Clinic, before attending patients, were submitted to TBL with clinical and interdisciplinary questions selected from previous exams of the National Student Performance Exam (ENADE). The interpretation of the results allowed us to infer that the TBL was useful in the learning process and in the evaluation of the students' training, since the teachers' understanding of the students' level of knowledge facilitated the selection of patients to be treated, ensuring technical excellence.

**KEYWORDS:** Active teaching-learning methodologies. Team Based Learning. Dentistry. ENADE

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**RESUMO:** O ensino da odontologia começa com disciplinas isoladas de cada área. Nos semestres finais, ocorre a Clínica Integrada, onde o aprendizado fragmentado é unificado. Sendo assim, o objetivo desse trabalho, de abordagem qualitativa, engloba a descrição, planejamento, execução e desenvolvimento de conceitos relativos a disciplinas do curso de Odontologia, utilizando o Team Based Learning (TBL) como Metodologia Ativa de Ensino-Aprendizagem (MAEA). Alunos que cursavam o oitavo período, no primeiro contato com a disciplina de Clínica Integrada, antes do atendimento a pacientes, foram submetidos ao TBL com questões de cunho clínico e interdisciplinar, selecionadas de provas anteriores do Exame Nacional de Desempenho dos Estudantes (ENADE). A interpretação dos resultados permitiu inferir que o TBL foi útil ao processo de aprendizagem e na avaliação da formação dos acadêmicos, uma vez que o entendimento dos professores do grau de conhecimento dos alunos facilitou a seleção dos pacientes a serem atendidos, garantindo excelência técnica.

**PALAVRAS-CHAVE:** Metodologias ativas de ensino-aprendizagem. Team Based Learning. Odontologia. ENADE.

**RESUMEN:** La enseñanza de la odontología comienza con disciplinas aisladas de cada área. En los últimos semestres, se lleva a cabo la Clínica Integrada, donde se unifica el aprendizaje fragmentado. Así, el objetivo de este trabajo, con un enfoque cualitativo, incluye la descripción, planificación, ejecución y desarrollo de conceptos relacionados con las disciplinas del curso de Odontología, utilizando el Team Based Learning (TBL) – Aprendizaje Basado en Equipo - como metodología activa de enseñanza-aprendizaje (MAEA). Los estudiantes que asistieron al octavo período, en el primer contacto con la disciplina de Clínica Integrada, antes del tratamiento de los pacientes, fueron sometidos a TBL con preguntas clínicas e interdisciplinarias, seleccionadas de pruebas anteriores del Examen Nacional de Desempeño Estudiantil (ENADE). La interpretación de los resultados permitió inferir que el TBL fue útil para el proceso de aprendizaje y en la evaluación de la educación de los estudiantes, ya que la comprensión de los profesores sobre el grado de conocimiento de los estudiantes facilitó la selección de los pacientes a tratar, asegurando la excelencia técnica.

**PALABRAS CLAVE:** Metodologías activas de enseñanza-aprendizaje. Team Based Learning. Odontología. ENADE.

## Introduction

Higher education has a classic transmissive training, in which the teacher is the center of the teaching-learning model and the student plays the exclusive role of spectator (COSTA; MIRANDA, 2021; IACOPINO, 2007; MACIEL *et al.*, 2019; MITRE *et al.*, 2008).

Within Dentistry, this classic learning model is still reverberated in most Teaching Institutions. Allied to the traditional educational context, the dental practice has developed in an analogous way, centered on the specialist professional, with development of the technique above other educational parameters (GALVÃO *et al.*, 2022). Moreover, the classical curricular grid of undergraduate dental courses is organized by disciplines that reflect fragmented

specialties, and only in the final semesters of the course occur the Integrated Clinics, which are the clinics in which the student, when attending patients, combines all learning by specialty obtained during the course. However, currently, the classic teaching procedures are being transformed in the Health area, which seeks to identify and correct deficiencies, in which the student, in the application of the content learned in a fragmented way, is unable to develop and apply it together in the final activity of patient care, through different alternatives of active teaching-learning methodologies (MAEA in the Portuguese acronym) (PAIVA *et al.*, 2016).

Given the need to meet this demand related to a comprehensive education, the National Curriculum Guidelines (DCN in the Portuguese acronym) for the Dentistry course established in the 2000s by the Chamber of Higher Education of the National Education Council, advocated a professional profile of the graduate in generalist, humanistic, critical and reflective dentistry, to act at all levels of health care, based on technical and scientific rigor (BRAZIL, 2018; GALVÃO *et al.*, 2022).

In an attempt to achieve an integrated and comprehensive education, the classic teaching methods, focused on memorization and simple transmission of information, become deficient, and this teaching is therefore insufficient when it comes to developing competencies and skills such as proactivity, collaboration, critical thinking, teamwork and entrepreneurial vision, desirable for today's world. One way to mitigate the failures of the fragmented teaching model by specialties/disciplines can be through the practice of MAEA. Still inserted in the new DCNs (BRAZIL, 2018), there is express provision for the use of MAEA as a theoretical referential framework and general competence of the student to the mobilization of cognitive, attitudinal and psychomotor capacities, which should emerge when a problem demands a solution (BRAZIL, 2018; GONTIJO *et al.*, 2020; MIRANDA; COSTA; COSTA, 2021; ROCHA *et al.*, 2016).

In view of this educational stir to be shaped and improved with the use of MAEA tools, Team Based Learning (TBL), created in the late 1970s, by Larry Michael, has as its main objective to improve learning and develop collaborative work skills through strategies such as the management of learning teams, preparation and application tasks of concepts, constant feedback and evaluation among peers (OLIVEIRA *et al.*, 2018).

Thus, this paper aims to describe the planning, implementation and development of content regarding the discipline of Integrated Clinic, using TBL as a teaching methodology in a Dentistry course. In the planning section, the number of students participating in the activity, the period and the subject they were studying will be described. In the implementation section, each of the stages of TBL application and the scores assigned to the activity will be explained.

Finally, the authors interpret the analysis of the results generated by the correction of the activity.

## **Material and methods**

This is a qualitative exploratory study. It covers a theme that is little applied in the academic training of health professionals, including in the Dentistry course. It is characterized mainly by an attempt to familiarize with the proposed TBL MAEA, which seeks to circumvent the fragmentation of teaching by area in the discipline of Integrated Clinical.

## **Research Participants**

The present study has as its corpus twenty students from the eighth period of the Dentistry course of the President Tancredo de Almeida Neves University (UNIPTAN). All the 20 enrolled students went through a TBL MAEA on the first day of class, before starting the Integrated Clinic course. This moment was chosen because it is a divisor in the Dentistry course curriculum, in which the fragmented learning becomes unified in a single discipline for better patient care and, consequently, student understanding. The 20 students underwent TBL individually, and then in groups, before the clinical activities, as a form of evaluative activity. All the work was conducted respecting ethical precepts, since, initially, the theoretical evaluation was already included in the Teaching Plan as an evaluative step of the discipline. When applying the TBL, the students were not identified and their individual results were not disclosed, thus this study was not submitted to the Ethics Committee of the educational institution.

## **Application of MAEA -TBL**

In the first phase of the TBL application, one week before the face-to-face class, the students were instructed to perform a preparatory study. The materials were made available by the teachers, consisting of chapters of reference books from the Integrated Clinic subject teaching plan.

Then the Individual Preparation Test was applied, based on questions from the National Student Performance Exam (ENADE in the Portuguese acronym) of the National Institute of Educational Studies and Research Anísio Teixeira (INEP), which is a standardized assessment in Brazil to assess skills and competencies. The selected questions had the common

characteristic of being clinical and interdisciplinary, reflecting the purposes of an Integrated Clinic.

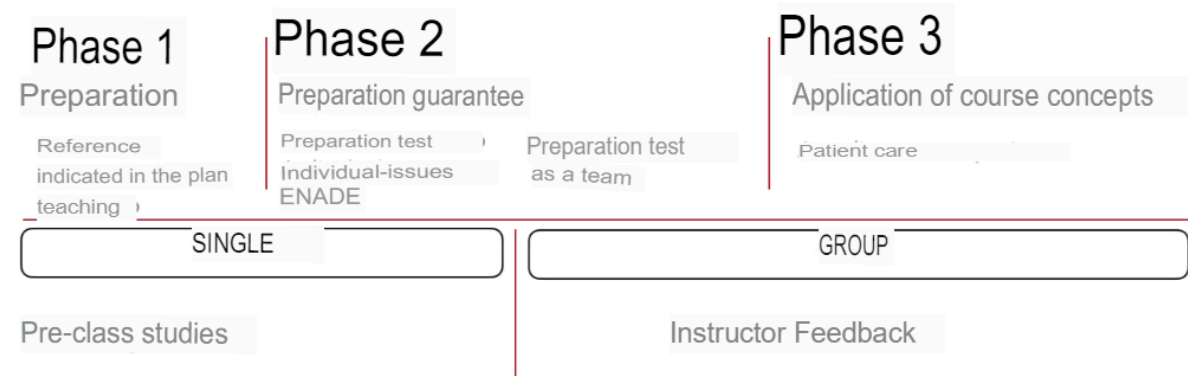
Each of the 20 students in the eighth period had 40 minutes to solve a test with 10 questions selected from tests applied in ENADE, individually. The tests were collected by the teachers. Afterwards, the teachers, carrying the answer key, made a blind correction, without pointing out to the student which question was correct or not. This preliminary correction revealed that none of the students got a maximum score in this first individual moment. The average score was approximately 65% right, which corresponds to about 6 questions. The grades were posted individually, however, the student was not aware of which specific questions he had answered correctly.

The second step was the Team Preparation Test, in which the students were divided into groups of four, forming a total of five groups. The members had to solve the questions again, analyzing the alternatives together, arguing among themselves to reach a common denominator and score one of the assertions. At this moment, each participant had a voice, exposed his level of knowledge, and defended his point of view regarding a clinical conduct to be adopted for the group he was part of, based on previous knowledge obtained during the Dentistry course. Each group then received a response card with all the alternatives sealed with colored tapes (Picture 1).

Similarly, the students again had 40 min to solve the same questions in groups. As they answered, the tape that sealed the answer was removed (Photograph 2), revealing the possibility of the correct answer. If the answer was correct, the picture of a star would appear (Photo 3). Then the group could move on to solving the next question.

Figure 1 – TBL application scheme and its phases along the process

## PHASES OF TEAM BASED LEARNING APPLIED



Source: Research data. Prepared by the authors

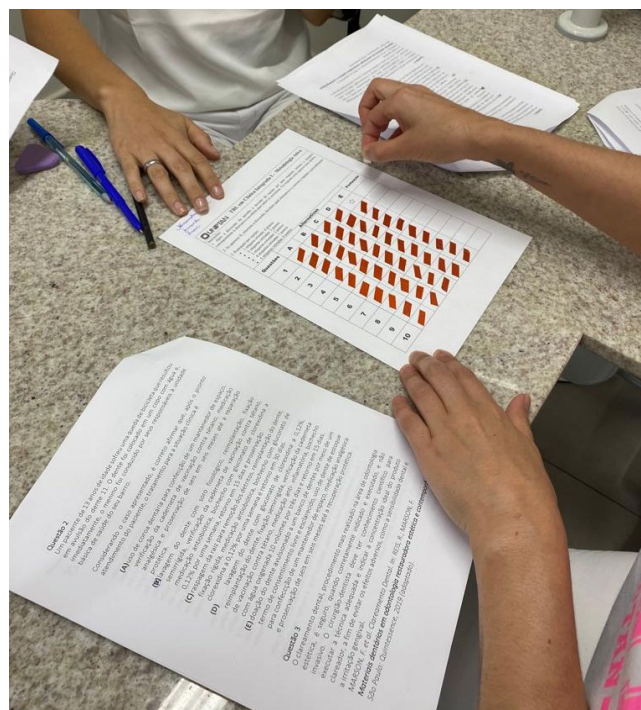
**Figure 2** – Example of a template distributed to the groups in TBL

Instruções:  
 1. Após a discussão da questão e decisão da equipe por uma resposta, retirem a etiqueta correspondente à alternativa escolhida para saber se acertaram. Na resposta certa aparece uma estrela.  
 2. Se aparecer X, retomem a discussão, decidam qual alternativa é a correta e repitam o procedimento.  
 3. Pontuação por equipe:  
 • 1 etiqueta retirada: 4 pontos  
 • 2 etiquetas retiradas: 3 pontos  
 • 3 etiquetas retiradas: 2 pontos  
 • 4 etiquetas retiradas: 1 ponto  
 • 5 etiquetas retiradas: 0 pontos

Questões	Alternativas					Pontuação
	A	B	C	D	E	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Source: Research data. Prepared by the authors

**Figure 3** – Students solving TBL questions in groups



Source: Research data. Prepared by the authors

**Figure 4** – Example of a template with the discovered answers and the corresponding scores

Instruções:  
 1. Após a discussão da questão e decisão da equipe por uma resposta, retirem a etiqueta correspondente à alternativa escolhida para saber se acertaram. Na resposta certa aparece uma estrela.  
 2. Se aparecer X, retomem a discussão, decidam qual alternativa é a correta e repitam o procedimento.  
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 • 4 etiquetas retiradas: 1 ponto  
 • 5 etiquetas retiradas: 0 pontos

Questões	Alternativas					Pontuação
	A	B	C	D	E	
1			X		☆	3
2		☆				4
3	☆					4
4		☆				4
5	☆			X		3
6		☆				4
7	☆					4
8			☆			4
9	☆			X		3
10			☆			4

Source: Research data. Prepared by the authors

The score was given according to the number of attempts, according to the orientation card initially received. If the first attempt was correct, the group scored four points, on the second attempt three points, on the third attempt two points, and on the fourth attempt only one point. If all five labels were removed, the question was not scored (Table 1).

**Table 1** – Score achieved according to the number of attempts to solve the questions

Number of attempts	Score
1	4
2	3
3	2
4	1
5	0

Source: Research data. Prepared by the authors

After collecting the answer cards from the groups, the teachers made an oral presentation about the main difficulties encountered by the students.

The application tasks, in a manner inherent to the Integrated Clinic, took place in the actual care by the students, divided into trios, to the patients.

The structure of the TBL applied can be seen in the form of a scheme in Figure 1.

## **Results and Analysis**

The interpretation of the TBL application was based on content analysis. Of the 5 groups, 2 got 80% of the test right, that is, in two questions, two attempts were made to reveal the correct answer. The other three groups found the stars on the very first attempt, demonstrating that the group activities had more promising results when compared to the individual ones. From 65%, the individual average score evolved to an expressive 92% group average.

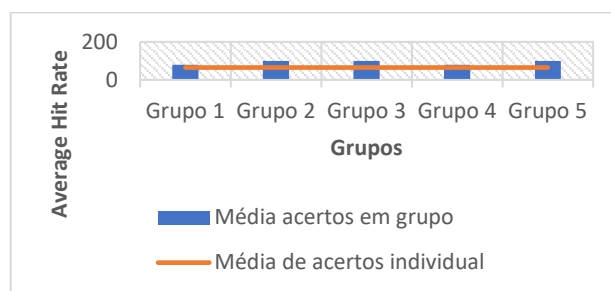
The exploratory analysis of the results allows us to better understand the context outside the academic environment in which the students are inserted. The students are young adults, with a mean age of 32 years, with work activities throughout the day, attending Dentistry at night. The knowledge of the environment narrows student/teacher relationships, breaking the cycle of unilateral vertical transmission of knowledge, besides forming professionals with a more humanized conception acting in the health area.

The teachers and students were able to interact in a playful way, besides understanding the level of assimilation of previous content and its possible application in the subject to be studied. The teachers' understanding of the students' level of knowledge facilitated the selection of patients to be treated, ensuring technical excellence and satisfaction of the entire service delivery chain.

The comparison of the average of individual and group answers raises the hypothesis that the application of the activity brings together the students in a playful way and encourages discussion of the content already taught and to be applied during the course. In addition, it raises the possibility that the teaching learning process can be more dynamic and integrative, focusing on the student.



**Graph 1** – Comparison of group and individual average scores<sup>6</sup>



Source: Research data. Prepared by the authors

### Final remarks

Although the core objective of the work was initially to highlight and learn more about the benefits of team learning, as well as the discussions raised from peer-to-peer dialogue, and this objective was met, a new objective was achieved.

Current educational research in the health sciences supports the use of TBL to inspire, engage, and motivate students to learn (ECHETO *et al.*, 2015). Medical and health science faculty are increasingly employing TBL to develop students' abilities to use self-managed learning teams in medical and dental education (ECHETO *et al.*, 2015). The initial goal of the work format in attempts to get it right, rather than simple right and wrong, was to bring the student into the reality of the dental office with patients and not the mere educational frustration of a simple correction. The application of the test itself offers the student the opportunity to receive group feedback of the correct answers and mistakes, with discussion and argumentation in pairs, reaching a common answer for the group.

It is important to emphasize that the application of the methodology must be done in a trustworthy manner, with a detailed description of its application, so that it is reproducible. This practice diverts suggestions of disadvantages and questions regarding the application of the methodology in different ways by other teachers, preventing the student from having the opportunity to expose inconsistencies between their current understandings and new experiences. The teaching learning process stimulates the development of new personal mental structures built on previous knowledge. Learning becomes active using relevant problems and group interaction. Teamwork skills are strengthened by focused reflection on new experiences during group sessions and successful teamwork by providing feedback to group members (HRYNCHAK; BATTY, 2012).

<sup>6</sup> Grupo = Group; Média de acertos em grupo = Average group hit rate; Média de acertos individual = Individual Average Hit Rate

Discussion among students is key, as it makes the student the protagonist of their own teaching and learning process. By arguing to the colleague, there is the formation of an argumentative clinical line of reasoning, based on scientific evidence, disclosing to the next their point of view.

From the observations made in the application, development and analysis of the results of the TBL, we suggest the validation of the hypotheses raised by applying it to other periods and periods of the dentistry course, other educational institutions, as well as cross-sectional and longitudinal quantitative studies of the use of this MAEA tool.

## REFERENCES

- BRAZIL. **Parecer CNE/CES n. 803/2018**. Diretrizes curriculares nacionais do curso de graduação em odontologia. Brasília, DF: MEC, 2018. Available at: <http://portal.mec.gov.br/docman/abril-2019-pdf/111231-pces803-18/file>. Access on: 12 Aug. 2021.
- COSTA, S. T.; MIRANDA, D. A. Relato de experiência no ensino da Dentística com base em metodologias ativas de ensino-aprendizagem. **Revista Da ABENO**, Porto Alegre, v. 21, n. 1, p. 1-6, dez. 2021. Available at: <https://revabeno.emnuvens.com.br/revabeno/article/view/1527>. Access on: 10 Jan. 2022.
- ECHETO, L. F. *et al.* Evaluation of Team-Based Learning and Traditional Instruction in Teaching Removable Partial Denture Concepts. **Journal of Dental Education**, v. 79, n. 9, p. 1040–1048, set. 2015. Available at: <https://onlinelibrary.wiley.com/doi/10.1002/j.0022-0337.2015.79.9.tb05997.x>. Access on: 22 Nov. 2021.
- GALVÃO, M. H. R. *et al.* Avaliação de um curso de Odontologia com base nas Diretrizes Curriculares Nacionais. **Revista Da ABENO**, Porto Alegre, v. 22, n. 2, p. 1-16, fev. 2022. Available at: <https://revabeno.emnuvens.com.br/revabeno/article/view/1785>. Access on: 06 Mar. 2021.
- GONTIJO, L. P. T. *et al.* Aceitabilidade das metodologias ativas de ensino-aprendizagem entre discentes de odontologia. **Revista Ibero-Americana de Estudos Em Educação**, Araraquara, v. 15, n. 4, p. 2023-2048, out./dez. 2020. Available at: <https://periodicos.fclar.unesp.br/iberoamericana/article/view/13693>. Access on: 23 Nov. 2021.
- HRYNCHAK, P.; BATTY, H. The educational theory basis of team-based learning. **Med Teach.**, v. 34, n. 10, p. 796-801, 2012. Available at: <https://www.tandfonline.com/doi/abs/10.3109/0142159X.2012.687120>. Access on: 03 Sept. 2021.
- IACOPINO, A. M. The Influence of “New Science” on Dental Education: Current Concepts, Trends, and Models for the Future. **Journal of Dental Education**, v. 71, n. 4, p. 450-462, abr. 2007. Dispo Available at nível em: <https://onlinelibrary.wiley.com/doi/10.1002/j.0022-0337.2007.71.4.tb04296.x>. Access on: 21 Oct. 2021.

MACIEL, M. M. S. A. *et al.* Metodologia ativa aplicada ao ensino odontológico: Um panorama nacional a partir de um estudo bibliométrico. **Archives of Health Investigation**, v. 8, n. 2, p. 74-78, fev. 2019. Available at em: <https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1006745>. Access on: 06 Oct. 2021.

MIRANDA, D. D. A.; COSTA, S. T.; COSTA, L. R. V. Combatendo modismos com ciência - Uso de metodologias ativas no ensino da dentística: Modismo ou necessidade? **J. Clin. Dent. Res.**, São Paulo, v. 18, n. 1, p. 118-121, abr. 2021. Available at: <https://preprints.scielo.org/index.php/scielo/preprint/view/3920>. Access on: 19 May 2021.

MITRE, S. M. *et al.* Metodologias ativas de ensino-aprendizagem na formação profissional em saúde: Debates atuais. **Ciencia e Saude Coletiva**, v. 13, n. 2, p. 2133–2144, dez. 2008. Available at: <https://www.scielo.br/j/csc/a/9M86Ktp3vpHgMxWTZXScRKS/abstract/?lang=pt>. Access on: 13 Oct. 2021.

OLIVEIRA, B. L. C. A. *et al.* Team-Based Learning as a Collaborative Learning Form and Flipped Classroom with Process. **Revista Brasileira de Educação Médica**, v. 42, n. 4, p. 86-95, out./dez. 2018. Available at: <https://www.scielo.br/j/rbem/a/bm8ptf9sQ9TdGwjYKc3TQFH/abstract/?format=html&lang=en>. Access on: 16 Oct. 2021.

PAIVA, M. R. F. *et al.* Metodologias ativas de ensino-aprendizagem: Revisão integrativa. **Sanare**, Sorocaba, v. 15, n. 2, p. 145-153, jan. 2016. Dis Available at ponível em: <https://sanare.emnuvens.com.br/sanare/article/view/1049>. Access on: 08 Oct. 2021.

ROCHA, J. S. *et al.* O uso da aprendizagem baseada em problemas na Odontologia: Uma revisão crítica da literatura. **Revista Da ABENO**, Porto Alegre, v. 16, n. 1, p. 25-38, jun. 2016. Available at: <https://revabeno.emnuvens.com.br/revabeno/article/view/231>. Access on: 18 Nov. 2021.

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