

Active Teaching-learning Methodologies: Medical Students' views of Problem-based Learning

Metodologias Ativas de Ensino-aprendizagem: a Visão de Estudantes de Medicina sobre a Aprendizagem Baseada em Problemas

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KEYWORDS

- Problem-Based Learning.
- Active Teaching-Learning Methodologies.
- Medical Education.

PALAVRAS-CHAVE

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- Metodologias Ativas de Ensino-Aprendizagem.
- Educação Médica.

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ABSTRACT

The prevailing undergraduate medical training process still favors disconnection and professional distancing from social needs. The Brazilian Ministries of Education and Health, through the National Curriculum Guidelines, the Incentives Program for Changes in the Medical Curriculum (PROMED), and the National Program for Reorientation of Professional Training in Health (PRO-SAÚDE), promoted the stimulus for an effective connection between medical institutions and the Unified National Health System (SUS). In accordance to the new paradigm for medical training, the Centro Universitário Serra dos Órgãos (UNIFESO) established a teaching plan in 2005 using active methodologies, specifically problem-based learning (PBL). Research was conducted through semi-structured interviews with third-year undergraduate students at the UNIFESO Medical School. The results were categorized as proposed by Bardin's thematic analysis, with the purpose of verifying the students' impressions of the new curriculum. Active methodologies proved to be well-accepted by students, who defined them as exciting and inclusive of theory and practice in medical education.

RESUMO

A formação oferecida em boa parte das escolas médicas perpetua, ainda hoje, o distanciamento do profissional das necessidades da sociedade. Estratégias têm sido pensadas em resposta a tal contexto, destacando-se a publicação das Diretrizes Curriculares Nacionais do Curso de Graduação em Medicina e a implementação do Programa de Incentivos a Mudanças Curriculares em Medicina (PROMED) e do Programa Nacional de Reorientação da Formação Profissional em Saúde (PRÓ-SAÚDE). Inscrito neste novo movimento, o Centro Universitário Serra dos Órgãos (UNIFESO) realizou uma profunda transformação curricular, em 2005, baseada no uso das metodologias ativas de ensino-aprendizagem (MAEA), especialmente a Aprendizagem Baseada em Problemas. Para aferir a visão dos estudantes partícipes deste processo de mudança foi desenhada a presente investigação, realizada através da consecução de entrevistas semi-estruturadas com estudantes do quinto período do Curso de Graduação em Medicina. Ato contínuo, os dados obtidos foram apreciados a partir dos princípios da análise temática. Os resultados apontam para uma boa aceitação das MAEA, as quais foram definidas como estimulantes e integradoras da teoria/prática no ensino médico.

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INTRODUCTION

Medical education in Brazil has undergone profound changes, promoted mainly by the Ministries of Education and Health and based primarily on the National Curriculum Guidelines for Undergraduate Medical Education (DCN), the Incentives Program for Changes in the Medical Curriculum (PROMED), and the National Program for Reorientation of Professional Training in Health (Pro-Saúde)¹⁻³. Based on these guidelines and programs, in the second semester of 2005, the Centro Universitário Serra dos Órgãos (UNIFESO) implemented an in-depth change in its medical school undergraduate curriculum^{4,5}. The change allowed a transition from the traditional biomedical training model to pedagogical processes contemplating the intricacy and interdependence of biological, social, psychological and environmental dimensions, among others^{6,7}, thus stimulating the restructuring of teaching-learning practices from the perspective of the healthcare work setting⁸.

The background for this change dates to the debate forums promoted by the Brazilian Association of Medical Education (ABEM) and the CINAEM project, in which UNIFESO took part since the first phase⁹. UNIFESO was also approved in the PROMED preliminary selection, which led to the drafting of the "EDUCAÇÃO" project, thereby launching a new educational model, integrating related fields of knowledge, with active teaching-learning methodologies (ATLM), specifically problem-based learning (PBL), as the main focus of the new curriculum. This process enabled interaction among various players, with a community-centered teaching focus and favoring students' autonomy for building knowledge and intervening in reality^{4,10-17}.

The active teaching-learning methodologies were chosen to situate students at the center of the pedagogical process, as the protagonists of their own training¹¹. Active methodologies in medical education were developed in Canada through the work of professors at the McMaster University School of Medicine, who created problem-based learning, officially instituted in 1969 after preliminary studies on curriculum change dating to 1966.

Since then, PBL has been adopted by the Universities of Maastricht in the Netherlands, Harvard in the United States, and Sherbrook in Canada, among a total of 60 other schools and universities. PBL was implemented at the School of Medicine in Marília, Paraná State, in 1997, and at the State University of Londrina in 1998 (both in Brazil).¹⁷⁻²⁰ Active methodologies (notably PBL)²¹⁻²³ have been used both for curricular improvement and to implement educational processes within specific areas of knowledge. Within this framework, in October 2005 the Brazilian Society of Family and Community Medicine

(SBMFC) held the first Exposition on Family and Community Medicine at UNIFESO, featuring experiences from the South and Southeast of Brazil and highlighting the potential of active methodologies for promoting comprehensive healthcare.²¹

Based on the above, a study on the use of active methodologies, specifically PBL, was conducted with undergraduate students at the UNIFESO School of Medicine. The objectives were: (1) to identify and analyze the reasons why students had chosen UNIFESO and whether the choice had been influenced by the adoption of the new teaching methodology and (2) to identify and analyze students' perceptions towards active methodologies/PBL. The current article presents the results of this research.

METHODS

Research setting: UNIFESO, a teaching institution located in the municipality of Teresópolis, Rio de Janeiro State, Brazil, 90 kilometers from the State capital (Rio de Janeiro city).

Study population: students regularly enrolled in the third year of the UNIFESO School of Medicine. The justification for the exclusive inclusion of this group was its reported experience with PBL (the students had already completed two years under this teaching-learning strategy).

Data collection tools: data were collected using individual semi-structured interviews (with one closed and two open questions) applied by the researcher with the voluntary cooperation of a sixth-semester medical student, previously trained in the interview technique. The questions were:

(1) Why did you choose UNIFESO to study medicine?

(2) When you made your choice, were you aware that UNIFESO had adopted a new teaching method? Yes () No ()

In case your answer to question 2 was "yes":

"Did this influence your choice?" Yes () No (). Why?

(3) UNIFESO has adopted active teaching-learning methodologies in the medical curriculum. How would you describe your experience with active teaching-learning methodologies at the UNIFESO School of Medicine?

The student's gender and age were also recorded on the questionnaire. The interviews were conducted on the UNIFESO campus, after the regular daily course activities.^{24,25}

Analytical strategy: The content analysis technique was thematic analysis (Minayo, 1999). Three operational stages of thematic analysis were used:

(1) Pre-analysis, divided into fluctuating reading, constitution of the thematic corpus, and formulation of hypotheses and objectives according to the interviewees' answers; (2) investigation of the material; and (3) treatment of the results and interpretation, as proposed by Minayo (1999).^{24,25}

The answers were analyzed in categories created on the basis of semantic criteria.²⁴⁻²⁹ The sample was defined according to "saturation of equal or similar answers" (from that point on, data collection was over), recognizing that a research sample must meet validity standards such as representativeness, exhaustiveness, and pertinence. Importantly, although this was a qualitative study, quantitative strategies were also used, including relative frequencies, in order to compare the answers.

According to Bardin²⁵ (2004), categorization is an operation involving classification of elements that constitute a set, by differentiation and then by regrouping, according to gender (analogy), using previously defined criteria. Selltiz et al. indicate three classification principles to establish categorical sets: 1) that they be established from a single classificatory principle; 2) based on the notion of exhaustiveness, that they allow the inclusion of any answer in one of the sets; and 3) that the categorical sets be mutually exclusive, such that one answer cannot be included in two or more categories. The current study adopted the semantic criterion for classification, i.e., attempting to create categories by themes, according to the answers provided to each question formulated with its correlated theme.²⁴⁻²⁹

Equally important is that the general analysis took into account the absolute frequency of the above-mentioned expressions to create each category, as well as the combination of the number of these expressions by the student, thus analyzing the number of interviewees and their categories in relative frequencies, which were then divided into categories related to positive impressions and categories related to negative impressions. This time the frequency of categories according to their expressions was determined in absolute frequencies (AF) and relative frequencies (percentages), as shown in the tables below, which were created for purposes of comparative analysis.

The final analysis considered the category with the largest number of expressions or the highest relative frequency, as well as the sum of expressions from all categories, with their positive or negative connotations, besides the number of interviewees and their categories in order to construct the interviewee's profile.

The research project leading to the article was approved by the Institutional Review Board of UNIFESO, case number 166/08, in compliance with Ruling 196/96 of the Brazilian National Health Council and related complementary legislation.³⁰

RESULTS AND DISCUSSION

There were a total of 29 interviewees, 15 male and 14 female. All students regularly enrolled in the fifth semester (72) were potential candidates, such that the sample represented 40.3% of the

total universe. Age varied from 20 to 27 years and was predominantly in the 20-23-year range. The sample, although seemingly small, was justified by the criterion "saturation of equal or similar answers", as previously described by Minayo (1999).^{24,25}

Choice of Medical School

The first open question, on the choice of the particular medical school, aimed to determine whether the student had chosen to study at UNIFESO based on his or her awareness of the adoption of active methodologies by the UNIFESO School of Medicine. Twenty-four of the interviewees had opted for the institution based on the category "references" (i.e., 82.8% expressed the idea of reference in their discourse), while 44.8% (n=13) expressed the idea of privileged geographic situation (location category). Table 1 shows the analysis and creation of categories from the ideas/expressions in the students' discourse.

TABLE 1.
Categories created from students' responses to Question number 1: "Why did you choose UNIFESO to study medicine?" Teresópolis, Rio de Janeiro State, Brazil, 2008.

Categories created	Examples of ideas/expressions	Absolute frequency (n)	Relative frequency (%)
Reference	<ul style="list-style-type: none"> • "Among the private medical schools in Rio de Janeiro State, it was the best." • "Tradition." • "Recommended by friends/acquaintances." • "Recommended by relatives that graduated from the same institution." • "Quality of the teaching." • "The best among the private medical schools in the area." 	24	83%
Ease in getting accepted	<ul style="list-style-type: none"> • "Lowest applicant/place ratio in the State." • "The only one where I got in." • "The first one where I got accepted." • "Less expensive." • "Transferred from another medical school." 	9	31%
Teaching proposal	<ul style="list-style-type: none"> • "Based on the pedagogical process using active methodologies." 	1	4%
Location	<ul style="list-style-type: none"> • "Proximity." • "Close to family." • "Support from a brother who studies in Petropolis [nearby city]." • "Pleasant town and climate." • "Very nice town." • "The town is calm." • "The town is quiet." 	13	45%

Source: primary research data

The teaching method's influence on students' choice of the medical school

The second question (in closed format) deals with the role of the pedagogical proposal in the students' choice of the specific medical school, verifying whether the student had prior knowledge of the institution's adoption of active methodologies and whether such awareness had influenced their choice. The tables below concern students who had been aware of the implementation of a new teaching model by UNIFESO (Table 2) and the potential influence on their choice (Table 3). Also shown are tables of categories created from students' ideas and/or expressions related to UNIFESO's adoption of active methodologies and the role in their decision, that is, whether the issue was (Table 4) or was not (Table 5) taken into consideration.

TABLE 2.

Interviewees' prior knowledge of the adoption of a new teaching model by the UNIFESO School of Medicine, Teresópolis, Rio de Janeiro State, Brazil, 2008.

Prior knowledge	Absolute frequency (n)	Relative frequency (%)
Yes	10	34.5
No	19	65.5
Total	29	100.0

Source: primary research data

TABLE 3.

Interviewees' prior knowledge of the adoption of a new teaching model by the UNIFESO School of Medicine and its influence on their choice of the school. Teresópolis, 2008.

Influence on choice*	Absolute frequency (n)	Relative frequency (%)
Yes	4	40.0
No	6	60.0
Total	10	100.0

* Considered only the 10 interviewees from Table 2 who knew the institution had adopted a new teaching model.

Source: primary research data

The data show that the choice of UNIFESO was influenced by the school's adoption of active methodologies, for four of ten students that were aware of the implementation of the new teaching model. The justification was "curiosity" or "good news" about the method, or a "positive impression" of it. Among the students who were aware that the institution had implemented the change in its curriculum but were not influenced in their choice, other references about the institution were sufficient to "compensate" for any potential feelings of insecurity towards the method.

TABLE 4.

Category created from ideas and/or expressions on the importance of the adoption of active methodologies by UNIFESO in students' choice of the school, when this issue was taken into consideration. Teresópolis, 2008.

Category created from the affirmative answer	Examples of ideas/expressions	Absolute frequency (n)
Positive reference towards the method	<ul style="list-style-type: none"> • "I was curious about the method." • "Other students already using the method spoke well of it." • "I had a positive impression." • "It was the main reason for choosing the school." 	4

Source: primary research data

TABLE 5.

Category created from ideas and/or expressions on the importance of the adoption of active methodologies by UNIFESO in students' choice of the school, when this issue was not taken into consideration. Teresópolis, 2008.

Category created from the negative answer	Examples of ideas/expressions	Absolute frequency
Institutional references	<ul style="list-style-type: none"> • "I would have chosen the same school, even if it used a traditional teaching methodology." • "Other references about the institution were sufficient." 	6

Active teaching-learning methodologies

The third question, an open one, deals with students' impressions concerning the role of active methodologies in undergraduate medical training at UNIFESO. Two major groups of categories were created: (1) those with a *positive classification* and (2) those with a *negative classification*. Table 6 shows the positive categories created from ideas/expressions mentioned in the interviews.

TABLE 6.

Positive categories created from ideas/expressions by the students in response to Question 3. Teresópolis, 2008.

(continua)

Positive categories*	Examples of positive ideas/expressions	Absolute frequency (n)	Relative frequency (%)
Autonomy	<ul style="list-style-type: none"> • "I learned to study and be independent." • "You pursue and find understanding." • "Creates autonomy." 	7	24.1%

Positive categories*	Examples of positive ideas/expressions	conclusão	
		Absolute frequency (n)	Relative frequency (%)
Responsibility	<ul style="list-style-type: none"> • "Creates independence in learning." • "Depends on the student's performance." • "I like it because we're responsible for what we learn." • "Very efficient, and you do your own search." 	3	10.3%
Integration between theory and practice	<ul style="list-style-type: none"> • "It favored relations between theoretical concepts and practice; under the previous method, this was harder." • "It highlights early practice." • "Early practical participation is valid, due to the correlation between theory and practice." • "You grasp things more quickly, and don't fear the patient." 	10	34.5%
Motivation to learn	<ul style="list-style-type: none"> • "You feel motivated to study." • "It gives me satisfaction. I'm very happy with the method." • "I could never get used to the traditional method again." • "It gives the student more freedom to make the most of leisure time." • "Freedom to study..." • "Fosters self-confidence." • "I discovered my individuality." • "You know what you're studying." • "Tutorials are great, because you explain and discuss what you studied, which favors learning." • "Very good for reasoning." • "Develops reasoning." • "Induces reasoning..." 	12	41.4%
Total:	-	32	-

* In answer to the question: "UNIFESO adopted active teaching-learning methodologies in the medical curriculum. How would you describe your experience with active teaching-learning methodologies at the UNIFESO School of Medicine?"
Source: primary research data

Two negative categories were created, "initial uneasiness" and "need for improvement", expressed in Table 7, which shows the relationship between negative categories and the ideas/expressions in the interviews.

TABLE 7.

Critical/negative categories created from ideas and/or expressions in response to Question 3. Teresópolis, 2008.

(continua)

Critical/negative categories*	Examples of negative ideas/expressions	Absolute frequency (n)	Relative frequency (%)
Initial uneasiness	<ul style="list-style-type: none"> • "At first I thought I wouldn't make it..."; 	8	27.5%

Critical/negative categories*	Examples of negative ideas/expressions	(conclusão)	
		Absolute frequency (n)	Relative frequency (%)
	<ul style="list-style-type: none"> • "I thought it was utopia, distant from practice." • "At first I preferred the old way." • "I had a lot of difficulty at first." • "I felt somewhat uneasy and insecure." • "Scared initially, didn't feel at comfortable with the method." 		
Need for improvement	<ul style="list-style-type: none"> • "There's a lot to be improved." • "The curriculum framework needs improvement." • "It's too recent at UNIFESO and needs improvement..."; • "It might improve the evaluation of practical tests." 	11	37.98%
Total:	-	19	-

*In response to the question, "UNIFESO adopted active teaching-learning methodologies in the medical curriculum. How would you describe your experience with active teaching-learning methodologies at the UNIFESO School of Medicine?"
Source: primary research data

Table 8 shows the relationship between positive and negative impressions towards the active methodologies. Most part of the students (62.1%; n=18) perceived the change positively.

TABLE 8.

Positive and negative impressions in response to Question 3, Teresópolis, 2008.

Impression	Absolute frequency (n)	Relative frequency (%)
Positive	18	62.1
Negative	11	37.9
Total	29	100.0

Source: primary research data

Table 9 summarizes the undergraduate medical students' views towards active methodologies in the new UNIFESO curriculum, based on an analysis of the categories and prevailing expressions.

TABLE 9.

Summary of undergraduate medical students' views towards active teaching-learning methodologies in the UNIFESO curriculum, Teresópolis, 2008.

(continua)

Items	Student demographics and views
Gender	Equal numbers of males and females
Age	20 to 23 years (90.0%)
Primary family healthcare unit	Proportionally distributed

(conclusão)

<i>Items</i>	<i>Student demographics and views</i>
Reason for choosing to apply to UNIFESO School of Medicine*.	Most common category: prior references about the institution, followed by location. 82.8% of sample.
Prior knowledge of the adoption of a new teaching model by UNIFESO*.	The majority (65.5%) were unaware of the new teaching model when the students applied.
Interviewees who had been aware of the new teaching model at UNIFESO and the <i>influence or lack thereof</i> on their decision*.	Most of the 34.5% of interviewees who were aware of the new model when they applied did not take it into consideration in their choice, arguing that other positive references about the institution were determinant.
Experience with active teaching-learning methodologies at UNIFESO School of Medicine.**	Students mostly had positive impressions (62.1% of the opinions), citing motivation to learn (41.4%) and integration of theory and practice (34.5%) as the main advantages of the new curriculum. Negative aspects were the need to improve the method (37.9%) and a sense of uneasiness towards it (27.5%).

* Questions analyzed by percentage of interviewees and categories.

** Question analyzed by percentage of interviewees, categories, and relative frequency of positive and negative expressions.

Terms in italics represent categories.

Source: primary research data.

Most of the students had a positive impression of the new curriculum, while emphasizing the need to improve the teaching method.

FINAL REMARKS

The need to improve medical education in Brazil has led various Schools of Medicine in the country to revise their curricula so as to ensure that medical school graduates will display the characteristics recommended by the National Curriculum Guidelines, Article 3:

Undergraduate Medical Education aims to provide graduating physicians with generalist, humanist, critical, and reflexive training, preparing them to act according to ethical principles in the health-disease process at the various levels of care, through the prevention of disease, promotion and recovery of health, and patients' rehabilitation, from the perspective of comprehensive healthcare, with social responsibility and civic commitment, thereby promoting comprehensive human health.(Brasil¹, 2001, p.1)

Proposals for changes in the medical curriculum change include the adoption of active teaching-learning methodologies³¹. In the State of Rio de Janeiro, UNIFESO (Centro Univer-

sitário Serra dos Órgãos) established a curriculum based on PBL in the second semester of 2005.^{32,33}

The current study was designed to investigate the impact of this change at UNIFESO. Data analysis suggests that most students chose the institution based on other references, and did not take the curriculum change into consideration. However, they showed positive impressions towards the active teaching-learning methodologies, which they referred to as stimulating, although needing improvement, which could be explained by the effective organization of the tutorial module in the UNIFESO undergraduate medical course, based on problem-solving related to biological, psychological, social, cultural, and environmental aspects of the health-disease process. Furthermore, the new curriculum facilitates the replacement of traditional medical teaching (teacher-centered and based on fragmentation of subjects) with a student-oriented model, where students are the protagonists in the construction of their own knowledge, conceived as non-dissociation between theory and practice, from an *inter-* (and eventually *intra-*) disciplinary perspective. This may well be the first step towards training physicians with a broader understanding of bio-psycho-social-environmental determinants, an essential element for the provision of appropriate healthcare for all.

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AUTHORS' CONTRIBUTIONS

All authors contributed fully in the various stages of research.

CONFLICTS OF INTEREST

The authors had no conflicts of interest.

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