Active teaching methodologies in health education

Metodologias ativas no ensino em saúde

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ABSTRACT

This study is a literature review on the contributions of active methodologies in Higher Education in the health area. From the reviewed literature (texts, articles and books), an academic essay was written, addressing ideas, reflections, literature citations and authors' personal impressions on the theme. After analyzing the literature, it was realized that active methodologies despite being involved in the teaching-learning process for several years, still require that teachers and students widely appropriate their benefits. The implementation of this change will help in coping with the factors that have negatively interfered in higher health education. It is a challenge that needs to be embraced by teachers and students. Conclusions: Active teaching methodologies can be included in all teaching models and methods and aim to promote learning and expand the possibilities for students to develop their competencies.

Indexing terms: Higher education. Learning. Teaching.

RESUMO

Este estudo trata de uma revisão de literatura sobre as contribuições das metodologias ativas no Ensino Superior na área da saúde. A partir da literatura revisada (textos, artigos e livros), foi redigido um ensaio acadêmico, abordando ideias, reflexões, citações da literatura e impressões pessoais dos autores sobre o tema. Após análise da literatura, percebeu-se que as metodologias ativas apesar de estarem envolvidas no processo ensino-aprendizagem há vários anos, ainda demandam que professores e estudantes apropriem-se amplamente dos seus benefícios. A implementação desta mudança auxiliará no enfrentamento dos fatores que tem interferido negativamente na educação superior em saúde. É um desafio que precisa ser abraçado por professores e estudantes. As metodologias de ensino ativas podem ser incluídas em todos os modelos e métodos de ensino e visam favorecer o aprendizado e ampliar as possibilidades dos estudantes no desenvolvimento de suas competências.

Termos de indexação: *Educação Superior. Aprendizagem. Ensino.*

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INTRODUCTION

Currently, the teaching-learning process has been more accessible to everyone. Society is culturally involved in digital inter-relationships and the speed intensification of the production and dissemination of knowledge has been widely valued [1]. However, this does not mean that learning is simpler. Having the tools to help students navigate in the learning challenges has been a complex task for teachers. Some factors have negatively contributed to this evolution. The debate about school failure, as of 2010, focuses on the multiple problems caused in and outside the school environment, pointing out that cause and consequence relationships are no longer the only way to explain it. There are several factors: 1) sociocultural; 2) individual; 3) emotional; 4) family; 5) gender; 6) low political concern with the subject's education; 7) the work-study relationship; 8) limited investment in education; 9) psychic and technical aspects; 10) pedagogical motivation and effectiveness; 11) difficulties caused by legal requirements. Moreover, the bureaucratic structures of the institution seem to hinder the achievement of learning, bringing the student and the University closer to failure in the teaching-learning process. Objectively, the reproduction of the school environment until the higher education, the development and use of technologies still little implemented, the ability to understand that learning is not dichotomous, but continuous, the difficulties for the development of scientific thinking and in time management, and delays in the curricula to get into specific subjects of the course are some facts that demotivate and compromise learning [2,3].

Considering the principles of applying andragogical theory to adult learning, the faculty needs to be well-prepared. It is necessary that the teacher understands and exercises his role as a mediator/facilitator/mobilizer of learning. For more effective educational activities, the following aspects should be incorporated: in order to take advantage of students' accumulated experience; to propose problems, new knowledge, situations synchronized with real life; to justify the need and usefulness of each piece of knowledge; to involve students in the planning and responsibility for learning; to stimulate and use internal motivation for learning; to make them "hands on" and consider their life experiences; understand diverse learning styles (pragmatic, reflective, theoretical, active); accept the student as a collaborator in the construction of knowledge, and not only as a passive receiver; facilitate access, means, time and opportunity must integrate the movement to face the challenges of education in the 21st century [2,3].

Teachers need to encourage self-directed learning, which is consistent with numerous content available through various media, especially digital media. In addition, it is important to: 1) stimulate the capacity for self-evaluation and self-criticism; 2) professional skills and the ability to work in teams; 3) develop means to increase the chances of self-regulation of learning by the student and the best way to conduct it (metacognition), that is, the understanding and self-monitoring of their own learning; 4) enable the student to develop problem-solving skills, training objective, organized and goal-defined thinking. The evaluation must be focused on the formative process and accompanied by appropriate *feedback*, otherwise there may be failure, which leads to delays and influences academic performance, possibly culminating in school dropout. It is the teacher's role to emphasize personal responsibility for one's own learning, and the need and ability for continued learning throughout life. Teachers need to stimulate social responsibility, to form competent professionals, with self-esteem, confident in their professional abilities and committed to the society they will serve [4,5].

For effective learning different teaching strategies and learning scenarios should be established during planning [6] considering multiple intelligences and different learning styles. It is up to the teacher to create and manage the planning and social engagement of the classroom (pedagogical ecosystem), so that optimal emotional and affective conditions can be created for learning [7].

The objectives of this review are: 1) to approach the use of active methodologies in health care, considering historical aspects; 2) to exemplify which are the main active methodologies that can be used in higher education in health care and their main contributions to the teaching-learning process.

Active methodologies and why use them

Active methodologies are teaching-learning strategies that appear to contribute to the development of skills relevant to the student in the 21st century. Although new research is needed to reinforce the positive differences of these

methodologies when compared to traditional ones, both in the student's professional and personal life, the literature has suggested that the impact on the development of competencies would be present, which are: 1) transdisciplinary view of knowledge; protagonism; 2) problem solving; 3) critical thinking; 4) idea generation; 5) instead of knowledge reproduction the possibility of access, reflection and analysis of information; 6) collaborative learning; 7) oral and written communication competence; 8) agility; 9) adaptability; 10) initiative and entrepreneurship [1,4,8]. Active methodologies innovate without disrupting the classical structure of educational institutions. It has been suggested that the student's learning performance can be improved by doing more active than passive activities, when compared to the traditional teaching method, where the teacher is the center of the process. It is based on collaborative learning and interdisciplinarity, student autonomy and didacticism. The exercise of leadership through influence; implementation of good ideas and solutions to positively impact those who experience them, is the purpose of contemporary and future education, and the active methodologies can contribute in these aspects [1,4].

The following will present active methodologies employed in higher education in the health area, with their definition and mode of application:

Problem-based learning

Problem Based *Learning* is an active methodology that emerged in the 1960s, from the theory of knowledge of the American philosopher John Evans, at Mc Master University in Canada, and initially developed in the medical course. It was created as a way for health professionals, already trained, to have an effective tool for the development of a proposal for permanent and continuous training, an imposition in the health area, where evolution is present. The characteristic of PBL is learning from the proposition of a problem, with a focus on its resolution, decision making, teamwork, and creativity. All this with tutorial groups. PBL structures the content knowledge of basic and clinical sciences to be applied in clinical settings. It is a proposal for curriculum development and a system for applying techniques and practices that recognizes the market needs, helping students to adopt an interested and participatory behavior, with cooperative and collaborative proposals and the ability to develop group work [9-11].

The applicability of the methodology requires trained human resources, with changing skills and attitudes as well as constant meetings and discussions of tutorial development. Physical structure with an ideal classroom, small and able to hold a single group or a small number of groups. Finally, material resources, with equipped laboratories and bibliographic collections in accordance with the demands [12].

The suggested problems, the starting point of the strategy, are evidently complex, challenging, constantly changing situations, as they happen in real life, and which do not present a single clear and immediate solution. The possible solutions are related to the context and are not easy, fixed and formulable. Research, information gathering, and reflection are required [10]. Steps for problematization: 1) reading the problem and identifying unknown terms; 2) identifying the problem proposed by the statement; 3) formulating explanatory hypotheses for the problem identified previously based on the group's previous knowledge; 4) summarizing the hypotheses formulated in step 3; 5) formulating learning objectives. Confrontation of experiences; 6) individual synthesis of the issues related to the learning objectives - experiential report; 7) provisional synthesis; 8) discussion; 9) reflective evaluation (student and tutor).

The tutor needs a posture change as the exercise of reflective work with students, requires availability for research, monitoring and collaboration in the critical learning of the student; they are mediators, companions, cognitive and metacognitive guides [13,10].

Team-based learning

Team-Based Learning (TBL) is an active teaching methodology developed in 1970 by Larry Michaelsen. TBL as a pedagogical strategy is based on the core principles of youth and adult learning [14]TBL, which initially values individual

responsibility for research on the part of the student, followed by a social process, with a moment in which the student's conduct will be confronted before his or her work teams, culminating in a motivational component that emerges for study. The application of the acquired knowledge and solution of the relevant questions must be presented within the context of professional practice [15].

The methodology can be applied in a hybrid model, also known as a "blended" model, which, integrates not only the school physical spaces , classroom and virtual space. The methodology promotes a strong learning stimulus in the participants, in which the members reach a level of cohesion, having as a final product, greater motivation from the participants.

This methodology allows a transformation from individual beings into members of a single group, united and motivated by the new cohesive knowledge achieved as a team. In this way, it contributes to the development of critical thinking, problem solving, self-management, better communication, collaborative action, and increased openness to the new [16].

The TBL method is specifically characterized by 3 moments: 1) individual preparation of the student, through the study of complementary materials previously provided by the instructor, which can range from scientific texts, videos on websites, journal articles to podcasts; 2) tests, of readiness assurance initially individual (iRAT) and later in team (gRAT), with the right to appeal and immediate feedback; 3) finalization with a moment dedicated to case discussions and activities, in which students will be guided and challenged to think and solve problems [16].

Peer instruction

Peer instruction or originally peer instruction was developed by Harvard University (United States) Physics professor Eric Mazur in which students are responsible for their own learning during class and focus their attention on the underlying concepts. The lectures are interspersed with conceptual questions, called *ConcepTests*, designed to expose common difficulties in understanding the material. Students have one to two minutes to think about the question and formulate their own answers; they then spend two to three minutes discussing their answers in groups of three to four, trying to reach a consensus on the correct answer. This process forces students to reflect on the arguments being developed and allows them (as well as the teacher) to assess their understanding of the concepts before they even leave the classroom. The challenge and purpose of *peer instruction* is to mobilize the student to study, because by realizing an error, they may be more open to listening to the teacher or peer, they may improve their understanding and metacognition [17,18].

Students learn both concepts and problem-solving skills, comparable to those acquired in traditionally taught classes. Peer instruction is easy to implement, requires no redesign of entire curricula, or expenditure of time or money. All that is required is a collection of *ConcepTests* and a willingness to spend some class time discussing with students [17,19]. The questions to be solved individually and in pairs are intended for creative, high-yield learning and allow for the detection of gaps in the material [20]. Good dynamics, interaction and engagement among students for discussion, which promotes cooperative learning and, according to the students, facilitates learning by topic [21]. In addition, improved student performance/level of understanding in introductory science subjects and increased level of student satisfaction with the subjects has also been reported [6].

Steps for the realization of the methodology [17]: 1) Teacher exposes a specific concept; 2) Teams are formed; 3) Application of a conceptual test; 4) Analysis of the answers by the teacher (If the performance is 30% or less, the teacher reviews the subject. If the performance is between 30 and 70%, the students review the question in pairs (peer instruction), discussing the question and a new vote is taken. If the yield is 70% or more, the teacher continues with the content explanation and moves on to the next question. This situation requires great preparation from the teacher, who must have several options of questions to be applied if the score is always 70%.

Just in time teaching

Just in time teaching or Tailored Teaching is a method proposed in 1996 by Gregory Novak, which used technology to enhance science learning in the classroom. Its goals are to develop the ability to work in groups, to communicate orally

and in writing, and to increase long-term retention of content knowledge [22,23]. The class is composed of several activities: lectures by the teacher (10-15 min) interspersed with demonstrations; exercises with spreadsheets; "hands on" activities in labs, etc. The key to promoting student engagement during the class is that there are changes in the activities they perform. These questions are related to the content being worked on in class, but present an intriguing question involving a different context. In this way, the teacher can assess whether the student is being able to transform the knowledge for the new situation.

Concepts, ideas, and theories are delivered to the student as they are needed for problem solving. Access to technology is perceived positively and increases educational dialogue, enabling learning communities [4].

Steps for the realization of Tailored Teaching:

1. The teacher indicates, some time in advance, a material to be studied by the students;

2. The student takes responsibility for preparing for class by completing the pre- assignment, usually a reading assignment.

3. The students answer electronically, within a deadline set by the teacher, some conceptual questions (Reading Task), which make up a WarmUp exercise [24] with the objective of introducing the content and stimulating critical thinking. The use of these pre-work questions (Reading Tasks) has a positive effect in helping students stay engaged with the study material. [22].

4. The teacher adjusts and organizes his class, giving feedback, focusing on the main difficulties manifested by the students, indicated by the answers to the preparatory tasks [17].

5. Organization of a 15-minute expository moment, optimizing the class time. In this expository/argumentative moment the teacher has the freedom to present the concepts that will be worked on and in which the students presented more difficulty, using the students' own answers to guide the discussions among them.

Think pair share

Think Pair Share (TPS), peer learning, is a methodology first proposed by Lyman (1981). Translated from Think Pair and Share, it can also be understood as Think, Understand Pair, Dialog and Share. Through it, the interaction between students is made possible, a cooperative activity of discussion is developed, since they must think together (in pairs and in groups). In this methodology it is necessary to exchange information, question, punctuate, select, argue, therefore, these are skills that, if developed, can enable great progress in the student's personal growth, and especially in the development of knowledge. The teacher's mediation, however, is fundamental in this process. An appropriate work with students allows the development of various aspects of thinking and, among them, we highlight the actions of conjecture, experiment, record, argue and communicate procedures and results [25].

Learning strategy, characterized by promoting a high degree of engagement, between the class and the teacher [26]. Through the promotion of dialogue, in which students expose their points of view individually and in pairs, structure a new thought and share it in a final moment with the other pairs and the teacher. Classified as an active and collaborative method, in Think Pair Share every student will share, at least at some point, his or her point of view, either in pairs or before the group. This promotes interactivity even for those who are shy or unwilling to participate [27].

This pedagogical strategy can be applied in an online class model, by using the zoom platform as a virtual classroom environment, or be planned and structured in face-to-face models. Moreover, it can be used as a specific dynamic, to lead the students to better expose their individualized and shared way of thinking about a certain subject or scenario [26]. In the method, the teacher acts as an instructor who provokes or instigates the students (through the use of images, written provocations, schemes, case studies, or audios) in order to create a "*triger*" to instigate reflection on the given subject. The opportunity to identify where specific students need more or less improvement in their learning from the teaching that is provided is also an advantage. And thus, enabling intervention with punctual and assertive improvements for the student, individually or collectively, because everyone participates [28].

The Think *Pair Share* method can be described in 3 Stages. [29] 1) Preparation: individual study; reading of texts on recommended topics; analysis of study material. Provocation with theme or material exposed by the teacher, followed by a moment of individual reflection time to synthesize the concept in a few lines; 2) Shared commitment: Discussion in pairs, on the individual reflections, moment of pooling ideas (20min); Individual test. Group test. Explanations by the expert, in person or remotely; 3) Application of the Course concepts: Application of a guided activity. Deepening of the subject. Sharing with the class what was condensed from the discussion between the pairs, everyone must participate exposing (1 to 2 min per student), ending with a closing of the activity, feedback of the individual placements (in a general way) and complementation of the theme by the instructor if necessary (10 to 20 min).

Wong (2021) noted in his study that although the intervention did not appear to have an impact on final grades, the majority of students subjected to this approach, were satisfied. Qualitative feedback on the Think-Pair-Share strategy was largely positive: perceived benefits to learning emerged as a dominant theme. Students also valued the collaborative nature of this teaching strategy [30].

Four Corners

The *Four Corners* strategy is an approach of challenging students with questions distributed in the four corners of the classroom (stations) promoting discussion among students on each of the 4 topics. This technique is found in two formats: traditional and adapted, and is most commonly used in face-to-face class formats. A more provocative learning strategy, which is characterized primarily by inducing the student to express his or her argumentation The exchange of impressions among students allows them to simultaneously assume the position of learner and teacher, receiving immediate feedback from their peers [31]. Students conduct the discussion under the supervision of the coordinator without interference. Each station lasts 15 minutes.

In the traditional model, the answers are closed, with no room for discussion, limited to the following alternatives: agree, don't agree, disagree, strongly disagree.

The adapted model is a good strategy for open-ended questions, discussion and exploration and multiple activities by students, Possibility to cover up to 5 topics in a short time. In this model, activities are planned in 3 stages [31,32]:

1. Preparation: send the previous activity, with the presentation of the objectives, one week in advance. Organization of the room with the problem situations and their answers; the function of the students within the groups should be determined.

2. During the activity: A reporter presents the problem situation and opens the group for discussion. After the group elaborates the answer, immediate feedback is given and the activity continues with the presentation of another question that continues the resolution of the problem situation. The activity continues until the problem situation is solved, in 3 or 4 rounds of questions. Each corner should last up to 15 minutes.

3. Closing: the teacher concludes the activity by expanding on the main topics and answering questions. This moment should last 20 to 30 minutes.

D2R

D2R is a flipped classroom based methodology, and assists in the transition from lecture classes to dialogical, more provocative lectures that have a different format than conventional lecture classes. Many lessons that are already consolidated can be adapted especially in situations where students already have a certain theoretical scope, but little mastery in applying this theory. One of the simplest ways to make a lecture class more attractive, allowing student participation, would be a dialogical lecture [33]This teaching strategy allows us to produce very organized and efficient dialogical lessons that satisfy both the teacher's and the student's objectives. It is an active methodology planned in the following steps:

1. Previous delivery of material: include objectives and study guide, which should be read, objectively. The association of video lessons and internet videos also helps in the adherence to the activity for study and learning.

2. Question session: to align the basic concepts, the teacher asks one question at a time, with stipulated time for discussion and answers by the groups, whose purpose is to check the reading and understanding of the previous material. One group presents the answer and the others can agree, complement, or disagree. If necessary, the teacher can show slides with images to explain the concepts. The questions are discursive at this stage.

3. More complex challenge session: cases of practical applications, or even more elaborate questions that require more thought and elaboration by the students.

4. Closing of the class, where the teacher presents the proposed objectives and both teacher and students analyze whether they were successful in the activities. In case there are still doubts or insecurities, another moment of explanations is held to finish the class.

Measures can be taken to prevent the lesson planned in this strategy from turning into a conventional expository lecture, such as: the teacher should not answer a student's questions immediately, but ask the student to share the question with colleagues in the group, as they may have the answer. However, it is important to make sure that this student is not left without an answer until the end of the lesson. Likewise, questions should be passed back and forth between groups, when doubts arise, before the teacher answers at the end in a clear and definitive way [34].

Gamification

Gamification is the application of game elements to non-game activities. Gamification was first used in 2010, and is based on the use of digital game elements with different and original contexts and proposals. What is important in this practice are the instantaneous feedbacks and the evolution of the students, remembering the rewards.

Gamification in education offers many advantages in the teaching and learning process, being. [35] 1) Social interaction; 2) Dynamic classes; 3) Creativity; 4) Engagement; 5) Effective communication; 6) Student protagonism; 7) Development of social skills. For the effectiveness of this active methodology it is extremely important the pedagogical advising and the necessary technological resources for a good development of the student and monitoring of the teacher.

JIGSAW

For the application of the active methodology called jigsaw, Bee (2019) presents a didactic sequence: 1) Division of the program into four study units; 2) Division of each unit into four parts; 3) Division of the class into groups of four elements; 4) Theoretical introduction to the methodology (preparation of information sheets); 5) Assignment of roles to the elements of the base groups; 6) Preparation of work guides; 7) Preparation of support sheets (summaries for expert groups and base groups); 8) Worksheets; 9) Differentiation of resources (worksheets, summaries of the subject and evaluation sheets). 10) Peer tutoring and mini- tests; 11) Diversification of strategies for consolidation of the subject; 12) Construction of behavior observation grids; 13) Preparation of individual and group assessment grids; 14) Differentiated behavior observation grids; 15) Definition of assessment criteria; 16) Preparation of a summary document of student behavior for analysis and joint reflection.

This strategy allows both content learning and social skills mapped by the records of relationships and cooperative attitudes throughout the process, which highlights the richness of this methodological learning strategy [33].

Realistic simulation

Simulation is an active methodology that makes teaching more dynamic and aims to promote students' autonomy and cognitive and psychomotor skills. Simulation is an educational resource capable of promoting a new paradigm in

relation to traditional teaching. It allows the student to explore a phenomenon, process, or procedure by adjusting parameters, and observing the response that the computer model gives, when using computer simulation. Simulation in healthcare includes very different educational experiences. An educational activity using health simulation can be described through four levels: instructional medium, simulation modality, instructional method, and presentation. [4,36].

A crucial step in clarifying and consolidating learning with clinical simulation in healthcare is to perform debriefing, which by definition is to methodically review events and why they occurred. It is a reflective exercise that can contribute to the student's integration of multiple knowledge in affective, cognitive, and psychosocial values, helping the acquisition of competencies [37].

There are standards for best practices in conducting clinical simulation that must be followed [38]. whose standards if not followed may include consequences related to ineffective assessment, inability of participants to understand the objectives or expected results, underutilization of resources, or inefficiency in the use of resources for simulation activities [39].

Microteaching

Microteaching is a technique used in teacher training for learning teaching skills, created in the 1960s by Stanford University professor Dwight Allen. This strategy can also be used in the teaching learning process [40]. Microteaching involves teaching from a real situation and recording short sessions of the lessons functioning as an instrument for practicing skills on the art of teaching and involves the steps of "plan, teach, observe, re-plan, re-teach and re-observe". The most important quality of participants in microteaching sessions is the ability to give and receive constructive feedback with an open mind, and favors the achievement of goals set in the teaching learning process. In addition, it increases participants' self-confidence. The microteaching activity proved to be an effective method for developing communication, problem solving, and critical thinking in healthcare students.

A recent study of graduate medical students found that anxiety, lack of confidence, poor time management, fear of public speaking, and incomplete preparation are other associated factors that influence overall participant performance, but the goal of the microteaching activity is to get students to understand different subjects and to practice skills for imparting knowledge [41]. The authors pointed out that internalizing microteaching skills can make physicians a better teacher, a better learner, and a better health educator.

FINAL CONSIDERATIONS

Considering the transformations focused on health promotion, in the logic of surveillance proposed by the Brazilian Health System, the Higher Education Institutions (HEI) are being stimulated to innovate the teaching and learning process to make professionals increasingly critical-reflective, active and protagonists in the construction of their knowledge, in order to promote transformations in health practices and meet the needs of the population [42].

The institution and the teachers must walk together in improving the teaching-learning process and the factors that involve academic performance. It is necessary to face any failure in the teaching-learning process as a temporality in which the student finds himself and not a condition of permanence [3]. It is important to emphasize not only the teachers' training but also the students' orientation, on the part of the educational institutions. Moreover, investments in classrooms with physical structure, sound and image resources, as well as specific materials are extremely necessary. [43]. The schools and their teachers must provide more and better conditions in the teaching and learning process. Furthermore, they must alert their students to be more concerned with their levels of satisfaction and lifelong learning.

Motivation and political will, as well as other aspects, internal and external to the students are important and are involved in the task of changing the educational system [44]. Nonetheless, considering active methodologies as coadjuvants in this trajectory, and in the development of student skills, seems to us an essential decision.

In light of the above, one can conclude that a long road of paradigm shifts needs to be walked, parallel to the long road of training teachers and students, to mitigate the actions already identified as contributing to the failure of academic performance, as well as the appreciation of Science for Teaching.

Collaborators

LF Sanglard, conceived the article, participated in the writing of the draft of the manuscript and was responsible for critical review of the manuscript. LB Oliveira, conceived the article, participated in the writing of the draft of the manuscript and was responsible for critical review of the manuscript. RB Brito Junior, wrote the draft of the manuscript and was responsible for critical review of the manuscript. MCM Calasans, wrote the draft of the manuscript. LFCC Simões, wrote the draft of the manuscript. YSMM Issa, wrote the draft of the manuscript and was responsible for critical review of the manuscript. RD Frateschi, wrote the draft of the manuscript and was responsible for critical review of the manuscript.

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