

ACTIVE METHODOLOGIES IN VOCATIONAL AND TECHNOLOGICAL EDUCATION

METODOLOGIAS ATIVAS NA EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA

Lucas Jonathan Martins Ribas¹, Eliane Loschi da Silva², Gêssica Thaís Nascimento Oliveira Ladeia¹, Denilson José da Silva², Pamela Scarlatt Durães Oliveira¹, Josefina Maria Sucasas Braz², Paula Xavier de Faria Alves³, Ariane Xavier de Faria Alves⁴, Hellen Juliana Costa Diniz¹, Natália Gonçalves Ribeiro¹, Ticiane Dias Prado¹, Ludimilla Duarte Alkimin¹, Jane Aparecida de Castro³

¹Universidade Estadual de Montes Claros. ²Instituto Federal de Educação, Ciência e Tecnologia do Sudeste de Minas Gerais. ³Universidade Presidente Antônio Carlos. ⁴Centro Universitário de Lins.

Resumo: O presente estudo buscou discutir às experiências e barreiras no uso das metodologias ativas de ensino na educação profissional e tecnológica. Conduziu-se um estudo teórico-reflexivo, foram consultadas as bases da Biblioteca Eletrônica Científica Online (SciELO), da PsycINFO, do Education Resources Information Center (ERIC), da Web of Science (WoS), a Biblioteca Digital Brasileira de Teses e Dissertações (BDTD) e o banco de teses e dissertações da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes). Os resultados revelam que as metodologias ativas potencializam a autonomia e o desenvolvimento de habilidades significativas, embora sua implementação enfrente barreiras culturais, como a resistência discente, e estruturais, como a precariedade de laboratórios e a fragmentação curricular. Evidenciou-se que a carência de formação pedagógica docente e o risco de um ensino puramente utilitarista comprometem a formação humana integral. O sucesso dessas práticas depende de políticas institucionais que garantam suporte técnico e tempo para o planejamento interdisciplinar. A análise das experiências e barreiras no uso das metodologias ativas na Educação

Profissional e Tecnológica permite concluir que a transição para modelos de aprendizagem centrados no aluno não é apenas uma escolha pedagógica, mas uma necessidade premente para o desenvolvimento de competências alinhadas ao século XXI.

Palavras chaves:: metodologias de ensino; metodologias ativas; ensino-aprendizagem; discente.

Abstract: This study aimed to discuss the experiences and barriers in the use of active teaching methodologies in vocational and technological education. A theoretical-reflective study was conducted, consulting the databases of the Scientific Electronic Library Online (SciELO), PsycINFO, the Education Resources Information Center (ERIC), the Web of Science (WoS), the Brazilian Digital Library of Theses and Dissertations (BDTD), and the database of theses and dissertations of the Coordination for the Improvement of Higher Education Personnel (CAPES). The results reveal that active methodologies enhance autonomy and the development of significant skills, although their implementation faces cultural barriers, such as student resistance, and structural barriers, such as the precariousness of laboratories and curricular fragmentation. It was evident that the lack of teacher pedagogical training and the risk of purely utilitarian teaching compromise integral human development. The success of these practices depends on institutional policies that guarantee technical support and time for interdisciplinary planning. An analysis of the experiences and barriers to the use of active methodologies in Vocational and Technological Education leads to the conclusion that the transition to student-centered learning models is not just a pedagogical choice, but a pressing need for the development of 21st-century skills.

Keywords: teaching methodologies; active methodologies; teaching-learning; student.

INTRODUCTION

In recent years, education has undergone a significant transformation driven by new pedagogical approaches that seek to make learning more dynamic, meaningful, and student-centered. In this context, active learning methodologies emerge as an effective alternative for fostering greater student engagement, autonomy, and critical development (Souza; Silva; Silva, 2025).

The use of active learning methodologies allows students to shift from being passive agents in the learning process to active ones; in other words, they effectively participate in constructing their own knowledge. These methodologies stimulate creativity and spark curiosity, as students engage with the theory and propose new ideas that have not yet been considered in class or by the instructor. Consequently, through their contributions, students feel valued and are motivated toward engagement, academic perseverance, and a sense of competence and belonging (Berbel, 2011).

As Paulo Freire (2011, p. 24) aptly wrote, “teaching is not transferring knowledge, but creating the possibilities for its production or construction.” Thus, active teaching-learning methodologies reflect Freire’s assertion by emphasizing that educators need to be stimulated, encouraged, and challenged to seek problem-solving strategies, thereby becoming protagonists in their own educational development. The most common teaching-learning practices within these methodologies are: hybrid learning, the flipped classroom, gamification, project-based learning, problem-based learning, and peer learning.

According to Barbosa and Moura (2013), within the context of Professional and Technological Education (PTE), there are numerous opportunities to employ active learning methodologies across various fields of study. Educators are familiar with and utilize these approaches—even if they do not explicitly label them as such—in practices such as project-based learning and problem-solving, which require active student participation. Through this dynamic, students develop critical thinking skills and gain autonomy in the learning process.

Over time, Vocational and Technological Education (EPT) has undergone various changes,

encompassing both conceptual and structural aspects. The creation of the Federal Institutes in 2008 redefined EPT by focusing on a human-centered approach. Its trajectory represents more than mere evolution; it has shifted from an emphasis on workforce training to an understanding of vocational education as the comprehensive development of the citizen. This approach is aligned with a democratic society, in which citizens constantly strive for their own personal development and that of their community (Sônego, 2022). Accordingly, this study sought to discuss the experiences and barriers associated with the use of active teaching methodologies in vocational and technological education.

METHODS

A theoretical-reflective study was conducted—that is, one that aims to consider the distinct dimensions constituting it. To this end, Therrien’s (2014) proposal regarding the pillars that constitute a research phenomenon—ontology, epistemology, and methodology—was adopted.

The study was conducted by identifying the theme, guiding question, and research objective; establishing subject descriptors, databases, and inclusion and exclusion criteria; defining the information to be extracted and evaluating the included studies; and subsequently interpreting the results and presenting the review and synthesis of knowledge.

The search was conducted between January and March 2026, guided by the following question: What are the experiences and barriers regarding the use of active teaching methodologies in professional and technological education? The descriptors used were “teaching methodologies,” “active methodologies,” and “teaching-learning,” employing Boolean operators to refine the search for studies to be analyzed. The secondary databases used for the search were the Scientific Electronic Library Online (SciELO) and the Catalog of Theses and Dissertations of the Coordination for the Improvement of Higher Education Personnel (CAPES), as well as the websites of agencies related to the subject of study.

The inclusion criteria were: publications addressing the analyzed topic, available online

in full text, in Portuguese, English, or Spanish, with no time limit regarding publication date. The exclusion criteria were: duplicate publications and works published solely in conference proceedings.

Following data analysis based on the selection and reading of the retrieved publications, a thematic content analysis was conducted—following Minayo’s approach—which is carried out through three interdependent phases: pre-analysis, material exploration, and interpretation of results (Minayo, 2014).

RESULTS AND DISCUSSION

It can be said that Vocational and Technological Education (VTE) requires learning that is meaningful, contextualized, and oriented toward the use of information and communication technologies; learning that fosters the intensive use of intellectual resources and develops skills for problem-solving and project management across various segments of the productive sector. Conversely, learning in VTE must increasingly diverge from traditional learning—which is grounded in the spoken word, theoretical in nature, and heavily reliant on rote memorization (Andrade; Gonçalves; Azevedo, 2017).

Complementing these learning requirements, it must be added that, even if the educational system produces individuals who are technically very well-prepared, it is essential that they be capable of demonstrating values and attributes of human development considered vital in the contemporary world of work—such as ethical conduct, initiative, creativity, flexibility, self-control, and communication skills, among others (Ferrarini; Saheb; Torres, 2019).

Regarding basic skills, it is concerning to note that some are underdeveloped within the VET learning process. In technology-related courses, for example, Goldberg (2010) identifies seven basic skills that are lacking in the training of our young people. In this field, our students struggle to: (1) ask good questions; (2) name technological objects; (3) model processes and systems qualitatively; (4) break down complex problems into smaller ones; (5) collect data for analysis; (6) visualize solutions

and generate new ideas; and (7) communicate solutions orally and in writing (Goldberg, 2010).

In this context, the implementation of active learning methodologies—such as Problem-Based Learning and the Flipped Classroom—within Vocational and Technological Education (VTE) fosters a necessary break from the traditional model of “knowledge transmission.” By placing the student at the center of the process, pedagogical practice shifts away from a sole focus on repetitive technique and begins to encourage intellectual autonomy (Moran, 2018).

However, this transition is not without conflict. The teaching experience has been observed to be marked by an “identity shock.” Teachers, formerly the sole possessors of technical knowledge, assume the role of mediator or facilitator. This shift requires the deconstruction of linear authority, which can give rise to feelings of insecurity. On the other hand, students—often accustomed to the passivity of traditional high school education—initially resist the cognitive effort demanded by active learning methodologies, highlighting that cultural barriers are among the first obstacles to be overcome (Neves, 2018).

A critical issue discussed in this research concerns infrastructural limitations. Vocational and technical education requires well-equipped laboratories and technological resources that do not always keep pace with the speed of pedagogical innovations. A lack of time for collaborative planning among peers also emerges as a significant barrier; the fragmentation of subjects hinders the implementation of interdisciplinary projects, which lie at the heart of active learning methodologies (Reyes; Herrera-Fernández, 2021).

Furthermore, the continuing education of teachers emerges as a strategic gap. Many vocational education instructors possess solid industry experience but lack the pedagogical grounding to apply complex teaching strategies. Without adequate institutional support, the use of active learning methodologies ends up being an isolated, heroic initiative by a few teachers rather than an institutionalized educational policy (Souza; Tinti, 2020).

Unlike general academic education, in Professional and Technological Education (EPT), active methodologies serve a specific social function: simulating professional reality. Discussions

indicate that the use of project-based learning methodologies bridges the gap between classroom theory and industry practice. When students are challenged to solve real-world problems within an industry or service setting, they develop communication, teamwork, and critical thinking skills—competencies that are valued just as highly as technical skills (Studart, 2019).

However, caution is required to ensure that education does not become merely utilitarian. The challenge here lies in the risk of turning active learning methodology into a tool for training workers solely for the labor market, to the detriment of the holistic human development advocated by the legal foundations of Vocational and Technological Education (EPT). Practice should aim to develop a worker capable of understanding the production process in its entirety, rather than simply operating machines or systems (Vieira; Souza, 2016).

Finally, the experiences analyzed demonstrate that the use of technologies and active methods can have a dual nature regarding inclusion. While gamification and the use of digital simulators boost engagement, disparities in access to digital literacy can exclude students from less privileged backgrounds. Therefore, the discussion concludes that the success of active methodologies in vocational education and training (VET) depends not only on the willingness of educators but also on a structure that ensures technological equity and psycho-pedagogical support.

Overcoming the existing barriers requires a restructuring of the curriculum—one conceived in an integrated manner that allows for flexibility in school time and space to accommodate innovation. Only then will active learning experiences cease to be “exceptions” and instead become the standard of excellence in technological education.

CONCLUSION

An analysis of experiences and barriers regarding the use of active methodologies in Vocational and Technological Education leads to the conclusion that the transition to student-centered learning models is not merely a pedagogical choice, but a pressing necessity for developing 21st-

century competencies. The study demonstrates that the effectiveness of Vocational and Technological Education lies in its ability to foster meaningful learning that transcends the traditional—purely theoretical and rote-based—model, favoring an educational approach that integrates technical mastery with intellectual autonomy and holistic human development.

The results demonstrate that, although active learning methodologies—such as Problem-Based and Project-Based Learning—successfully bridge the gap between academic theory and labor market practice, their implementation faces obstacles of various kinds. Cultural barriers—manifested both in faculty insecurity regarding the new role of facilitator and in student resistance to proactivity—were identified as the primary challenge to be overcome. Compounding this are infrastructural limitations and a lack of ongoing pedagogical training for instructors who, despite being experts in their technical fields, lack the necessary support to implement complex teaching strategies.

Furthermore, the research warns of the risks associated with a purely utilitarian approach. The implementation of these methodologies must be grounded in a commitment to developing critical professionals capable of grasping the entire production process, rather than merely replicating technical tasks. The issue of technological equity also emerges as a critical concern, requiring that pedagogical innovation be accompanied by policies for inclusion and digital literacy to prevent the modernization of methods from exacerbating social inequalities.

It is concluded that the consolidation of active learning methodologies in Professional and Technological Education (EPT) requires coordinated institutional action that goes beyond the isolated efforts of individual stakeholders. It is imperative that institutions foster integrated curricular restructuring, ensuring time for interdisciplinary planning, infrastructure investment, and psycho-pedagogical support. Only through an institutionalized educational policy will it be possible to transform these innovative practices—currently treated as exceptions—into the standard of excellence essential for developing citizens and professionals capable of acting ethically, creatively, and resiliently in the contemporary world.

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