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CHAPTER 2

INCLUSIVE PEDAGOGICAL STRATEGIES IN MEDICAL EDUCATION: ACTIVE METHODOLOGIES AND THEIR ADAPTATIONS FOR NEURODIVERGENT PEOPLE

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ABSTRACT

This article discusses inclusive pedagogical strategies in medical education, focusing on adaptations of active learning methodologies for neurodivergent students, such as those with ADHD, ASD, and dyslexia. These learners process information differently, requiring personalized approaches that respect their specific needs without compromising educational quality. The discussion is grounded in the Brazilian Inclusion Law (Law No. 13.146/2015), highlighting the importance of curriculum flexibility, diversified assessment methods, and accessibility resources. The aim is to create an accessible, welcoming, and equitable academic environment, placing the student at the center of the learning process and fostering their full participation in medical training.

Keywords: Neurodivergence; Active learning methodologies; Inclusion; Medical education; Curriculum flexibility.

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INTRODUCTION

The way we currently understand neurodiversity has undergone significant changes, conceptualizing and valuing the different ways in which these individuals think, learn, and perceive the world. This concept has gained prominence in higher education, particularly in medical programs in Brazil. Historically, this academic field has been grounded in very rigorous standards, dense curricula, extensive workloads, and standardized assessment methods. While this structure works for many, it can become a barrier for neurodivergent students. Given this perspective, the following question arises: What pedagogical strategies can be adapted in medical education based on active methodologies for neurodivergent students?

Neurodiversity can be understood as a social movement formed by individuals and groups advocating for the creation and effective implementation of public policies aimed at the educational inclusion of people with different types of disabilities. More than an academic concept, it is a struggle for rights, seeking to ensure that the educational environment recognizes and values multiple forms of neurological functioning. As highlighted by Araújo, Silva, and Zanon (2023), this movement proposes viewing cognitive and behavioral differences not as limitations to be corrected, but as legitimate expressions of human diversity, which should be embraced and respected in pedagogical practices and educational policies.

Neurodivergence refers to individuals with specific conditions characterized as neurodevelopmental disorders that can affect various areas, particularly learning. Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), and dyslexia, among others, are examples of common disorders present today in academia across various programs, especially in health-related fields. These students learn differently from the majority of their peers. This does not mean they learn “less,” but rather that they learn in their own way, as they process information uniquely. Therefore, the main challenge for educators is not to try to “correct” them, but to provide an academic environment that values diverse ways of learning.

In light of this reality in medical education, this article aims to analyze and propose pedagogical strategies and curricular adaptations that promote the effective inclusion of neurodivergent students in medical programs, aligning with public policy guidelines for educational inclusion and the specific needs of these students. Based on active methodologies—considered innovative in the field of medical education—and with the purpose of placing the student at the center of the learning process, these approaches allow educational experiences to be personalized, facilitating adaptation for the inclusion of neurodivergent students.

Among these strategies, some stand out for their potential to promote inclusion and accessibility: Problem-Based Learning (PBL), flipped classroom, and gamification, among others. Thus, the

bibliographic review methodology applied to the study of curricular adaptations for neurodivergent students in medical education involves the collection, analysis, and critical synthesis of academic publications, official documents, and recent research related to the topic. This approach makes it possible to identify key concepts, innovative pedagogical practices, and the challenges faced in including these students in medical programs.

Therefore, curriculum flexibility represents an opportunity to adjust not only content and resources but also assessment methods and deadlines. This may include oral exams instead of exclusively written ones, the use of portfolios, practical assignments, or extra time for completing tasks. It is important to emphasize that flexibility does not mean "making things too easy" or "lowering quality"; rather, it means offering different pathways so that everyone has fair conditions to demonstrate their competence.

THEORETICAL FRAMEWORK

CONCEPT OF NEURODIVERSITY

The term neurodiversity refers to the multiplicity of human brains and minds, distinguishing multiple ways of feeling, perceiving, learning, and interacting with the world. Among the main conditions present in the neurodivergent community are ADHD, ASD, dyslexia, dyscalculia, among others. These conditions should not be viewed merely as deficits, but rather as differences, with unique strengths and challenges.

In Brazil, the inclusion of neurodivergent students in Basic Education is supported by a robust set of laws and guidelines that guarantee their educational rights and seek to ensure equal opportunities. The Federal Constitution of 1988 is the primary legal framework, establishing that education is a right for all and a shared duty between the State and the family, prohibiting any form of discrimination in access to education.

This constitutional principle serves as the foundation for inclusive educational policies aimed at building schools that embrace human diversity, recognize different ways of learning, and provide appropriate support so that each student can fully develop their potential. Thus, legislation acts not only as a legal norm but as a social commitment to equity and respect for differences, including the specific needs of neurodivergent students.

The National Education Guidelines and Framework Law (LDB) – Law No. 9.394/96, considered the main Brazilian educational legislation, reaffirms the importance of education that is truly inclusive. More than a principle, it establishes as a duty that educational systems guarantee all students—including those with special educational needs—not only the right to enter school but also to remain there and

succeed in their educational journey. This is a legal and ethical commitment to equity, which seeks to provide real learning opportunities, valuing diversity and respecting the particularities of each student.

> Education, the right of all and the duty of the State and the family, shall be promoted and encouraged [...] aiming at the full development of the person, their preparation for the exercise of citizenship, and their qualification for work. (BRAZIL, 1988, art. 205).

In this sense, it is essential that public policies and pedagogical practices work together to promote inclusive school environments capable of recognizing and valuing multiple ways of learning and contributing to society, ensuring that each individual has a real opportunity to reach their maximum potential.

ACADEMIC INCLUSION POLICIES IN THE BRAZILIAN CONTEXT

Discussing inclusion in the Brazilian educational context is, above all, addressing a commitment to equality and the appreciation of diversity. It means understanding that each student brings their unique way of learning and relating to knowledge and that, above all, educational institutions must open new spaces for the inclusion of all.

This commitment is enshrined in the Federal Constitution of 1988, which guarantees education as a right for all and a duty of the State and the family. Over time, other laws have emerged to strengthen and detail this idea. The National Education Guidelines and Framework Law (LDB – Law No. 9.394/1996), considered the cornerstone of Brazilian education, determines that educational systems must go beyond mere enrollment and create real conditions for all students—including those with special educational needs or neurodivergence—to have opportunities to learn with dignity, develop their skills, and achieve success.

The Brazilian Inclusion Law for Persons with Disabilities (Law No. 13.146/2015) expands this vision, emphasizing that inclusion is not limited to placing the student in the classroom. It involves modifying the educational environment to make it accessible, welcoming, and respectful. It means ensuring the existence of resources, modifications, specialized support, and assistive technologies that enable the student to fully participate in academic life.

More recently, Law No. 14.254/2021 focused specifically on students facing dyslexia, ADHD, and other specific learning disorders, highlighting the importance of early diagnosis and continuous support.

These guidelines demonstrate significant progress: the understanding that inclusion is not an act of kindness or an isolated program, but an essential human right. They form the legal basis for educational institutions to implement more humanized practices, adaptable curricula, and pedagogical approaches that consider the pace and particularities of each student.

Ultimately, Brazilian legislation invites us to view inclusion not as a bureaucratic obligation but as an ethical and social choice necessary to train citizens and professionals who are more empathetic, aware, and prepared to live in a diverse world.

CURRICULAR ADAPTATIONS

Curricular adaptations serve as crucial strategies to ensure the effective inclusion of neurodivergent students in medical programs, taking into account their unique needs within a traditionally rigid and demanding academic environment. These adaptations involve deliberate and thoughtful modifications to content, teaching methods, assessments, and educational resources, aiming to create equitable conditions so that all students can acquire knowledge and demonstrate their understanding fairly.

In the context of medical education, curricular modifications may include, for example, extending deadlines for submitting assignments and taking exams, employing various assessment formats such as oral exams, portfolios, and practical evaluations, along with the adoption of assistive technologies that aid in organizing, understanding, and communicating material. Additionally, diversifying teaching methodologies—such as Problem-Based Learning (PBL), flipped classrooms, and gamification—allows students to engage with knowledge in a more active, meaningful, and personalized way.

Furthermore, the development of Individualized Pedagogical Plans (IPPs) is a practice that ensures adaptations are carefully planned and implemented, considering the profile and specific needs of each neurodivergent student, with the involvement of educators, specialists, and the students themselves. This promotes monitoring, psychopedagogical support, and the establishment of an educational environment that is welcoming and sensitive, respecting differences.

Curricular adaptations do not imply lowering expectations or the quality of education; rather, they acknowledge neurological diversity and advocate for educational equity, providing varied pathways for each student to reach their full potential. When effectively implemented, these strategies increase academic retention, promote holistic development, and prepare medical professionals for successful engagement in a pluralistic and diverse society.

EDUCATIONAL STRATEGIES FOR ACTIVE METHODOLOGIES

Active methodologies are pedagogical strategies aimed at promoting students' active participation in knowledge acquisition, enabling them to develop critical thinking, autonomy, and practical application of the content addressed in class. This contrasts with the traditional teaching model, in which the teacher was the sole agent responsible for transmitting knowledge and the student a passive recipient.

Active methodologies have increasingly stood out as one of the main tools for innovation and effectiveness in higher education, especially in medical training, where there is a greater demand due to the complexity of the content addressed in class. This requires practical and critical skills that place students at the center of the learning process.

In medical education, these methodologies have contributed to the training of professionals who are better prepared for the job market, capable of dealing with the complex challenges of clinical practice, and reinforcing skills such as teamwork and decision-making in new and unforeseen situations.

Based on active learning and grounded in constructivist principles, the use of methodologies that can be made inclusive—such as flipped classroom, problem-based learning (PBL), and gamification—emerges as an effective strategy for promoting the inclusion of neurodivergent students. These methodologies can be structured to respect the specificities of these students, ensuring a more accessible, personalized, and engaging environment. Thus, certain strategies can be applied to ensure inclusion occurs efficiently and integratively, fostering equitable learning. Below are some of these methodologies and possible adaptations for this purpose:

Problem-Based Learning (PBL)

- Small and heterogeneous groups: Reduce group size to minimize sensory overload and facilitate communication, benefiting students with ASD and/or ADHD.
- Flexible time for problem analysis: Allow more time for neurodivergent students to understand and reflect on the cases presented.
- Support from a trained facilitator: Include teachers or facilitators capable of identifying specific needs and mediating conflicts or communication difficulties.
- Adapted and diversified support materials: Provide complementary resources (schematics, videos, simplified texts) for different learning styles.
- Structured feedback and positive reinforcement: Offer clear and consistent feedback on participation and performance, aiding organization and motivation.

Flipped Classroom

- Provide content previews in different formats—videos, podcasts, texts, and infographics—so students can access them at their own pace and preference.
- Students who need more processing time can review the material as often as necessary before or during in-person classes.
- During class, offer moments for personalized support or small-group assistance.

- Provide clear and organized guidelines to accompany the preparatory materials, facilitating focus and study planning.
- Use of assistive technologies: Integrate digital tools that help with organization, reading, and concentration.

Gamification

- Challenges adjusted to each student's pace: Allow students to complete engaging activities at their own speed, reducing pressure and anxiety.
- Immediate rewards and feedback: Encourage engagement through points, badges, and positive messages that value small achievements.
- Variety of games and formats: Include quizzes, simulations, "clinical missions," and interactive games that cater to different cognitive profiles and interests.
- Safe and collaborative environment: Encourage participation without excessive competitiveness, focusing on learning and teamwork.
- Ensure that game elements are integrated with the content and competencies established, maintaining academic rigor.

Complementary Strategies

- Develop Individualized Pedagogical Plans (IPPs) to map specific needs and guide adaptations in active methodologies.
- Train teachers to understand and apply inclusive practices within these methodologies, recognizing neurodivergent profiles.
- Adjust physical space and activity pace to minimize excessive stimuli and enhance student comfort.
- Incorporate tools that facilitate organization, communication, reading, and concentration.
- Complement and adapt traditional assessments with oral exams, portfolios, presentations, and practical activities, avoiding overloading students with purely objective tests

METHODOLOGY

This article is a systematic literature review aimed at mapping and integrating the knowledge developed on curricular adaptations in the context of medical education, focusing on neurodivergent students (such as individuals with ASD, ADHD, dyslexia, and other neurological conditions).

> [...] it is a type of research that uses literature on a given topic as its data source. This type of investigation provides a summary of the evidence related to a specific intervention strategy through the application of explicit and systematic methods for searching, critically appraising, and synthesizing the selected information. (SAMPAIO & MANCINI, 2006, p. 84)

To ensure this research had a robust and reliable foundation, it was essential to decide in advance which types of materials would be included and which would be excluded from the evaluation. Therefore, relevant scientific publications were selected, such as articles, theses, and dissertations, as well as official documents, guidelines, and legislation that specifically addressed issues related to curricular adaptation, neurodiversity, and medical education.

To ensure that the information aligned with contemporary reality, priority was given to works published in the last ten years. It was also determined that publications in Portuguese and English would be accepted, which broadened the scope of the research and allowed for the inclusion of diverse perspectives, both international and national.

The searches were conducted in databases recognized in the academic environment, such as PubMed, SciELO, Google Scholar, and Web of Science, ensuring that the selected sources were reliable and of high quality.

Conversely, all works that did not directly address the issue of curricular adaptation in medical education for neurodivergent students were excluded, as well as opinion articles or those that had not undergone peer review. This rigorous selection aimed to ensure that the analyzed content was well-founded, relevant, and contributed significantly to the development of the discussion proposed in this study.

RESULTS AND DISCUSSION

The literature indicates that inclusive strategies improve not only academic performance but also the institutional climate. The greatest challenge lies in teacher training and in pedagogical practices that are traditionally centralized. It is recommended that institutions promote teacher training, create inclusion committees, and conduct ongoing evaluations of the implemented adaptations. The limitations of this study include the need to involve a larger number of institutions and to expand longitudinal monitoring of the impacts.

The reviewed publications present various suggestions and forms of curricular adaptations, but they consistently emphasize flexibility in assessment methods. The introduction of assistive technologies and the adoption of active methodologies such as PBL, flipped classroom, and gamification have shown greater effectiveness in meeting the needs of neurodivergent students.

It is important to highlight the implementation of an Individualized Pedagogical Plan (IPP), which facilitates knowledge acquisition according to each student's specificities. This personalized approach has a positive impact on retention, motivation, and academic performance.

Regarding teacher training and support for this demand, the studies emphasized the need for continuous professional development as a guarantee of new, consciously inclusive practices. Raising awareness and preparing teachers for these practices can transform the institutional environment, ensuring that adaptations are effective and integrated into the academic curriculum while respecting the uniqueness of these students.

The findings of the analysis show that integrating neurodivergent students into medical education requires a diversified strategy that combines innovative teaching methods, interdisciplinary support, and inclusive policies. Active approaches, by placing the student at the center of the learning process, foster engagement and personalized learning, benefiting not only neurodivergent students but the entire academic community by creating more dynamic and collaborative environments.

The development of Individualized Pedagogical Plans (IPPs) emerges as an essential strategy to systematically identify and address personal needs, demonstrating that true inclusion must involve adapting academic pathways without compromising the quality or rigor of education. However, this process is highly dependent on teacher training and institutional commitment.

The challenges faced underscore the need for investments in infrastructure, training, and cultural change so that neurodiversity is genuinely valued as an asset that enriches medical education. It is crucial for institutions to create safe and welcoming environments where differences are not only accepted but valued as sources of innovation and empathy in healthcare.

Finally, this analysis suggests that future research should explore in greater detail the evidence on the impact of curricular adaptations on mental health, academic performance, and employability of neurodivergent students, contributing to the continuous evolution of inclusive educational practices in medical education.

FINAL CONSIDERATIONS

Curricular adaptation for neurodivergent students is essential to promoting medical education that is more equitable, diverse, and committed to inclusion. Institutions that adopt this approach help shape future professionals who are more receptive to differences and prepared to address human diversity, reinforcing the social role of Medicine.

Measures such as creating Individualized Pedagogical Plans (IPPs), focusing on continuous teacher training, and applying active methodologies tailored to students' specificities have proven fundamental for building learning environments that are more dynamic, welcoming, and effective.

However, the success of these initiatives is directly linked to institutional commitment, the existence of solid public policies, and collective efforts to foster cultural change in medical schools.

Therefore, the inclusion of neurodivergent students not only breaks barriers regarding access and retention but also enriches medical education with a variety of perspectives and ways of thinking. By valuing these differences, educational institutions help train professionals who are more empathetic, critical, and prepared to work in a diverse society, transforming medical education into an environment of equity, respect, and innovation.

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