

Analysis of the National Curriculum Guidelines for Dentistry in light of active methodologies: an ongoing transformation?

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Abstract This theoretical-reflective essay critically analyzes the National Curriculum Guidelines (NCGs) for undergraduate Dentistry programs in light of Active Teaching-Learning Methodologies (ATLMs). The study employs a qualitative reflective approach to examine possible convergences between the legal framework (Resolution CNE/CES No. 3/2021) and the 10 ATLM pillars. The assumptions of these ten pillars comprise the study's conceptual framework: student protagonism and autonomy; interaction and learning community; critical reflection and meaningful learning; respect for context and diversity; recognition of learners' prior knowledge; development of socio-emotional skills as the key for active, collaborative, ethical, and socially committed learning; investigative and challenging approaches centered on life; integration between theory and practice; dialogue between technologies (interactions between analog and digital learning resources); and formative process-oriented assessments within innovative learning pathways. The theoretical-methodological construction of these pillars is grounded in critical, constructivist, historical-critical, and andragogical education theories, using an action-research methodology. The study evidenced ATLMs in the current NCGs as an indicator of advancement in educational processes for Dentistry courses across all analyzed pillars. However, effectively implementing these guidelines requires curricular changes and the intentional application of methodologies that stimulate critical thinking, foster student protagonism, and promote emancipatory teaching mediation. These methods should be aligned with an ethical and socially responsible institutional commitment. This scenario suggests that educational institutions are experiencing an ongoing transformation.

Descriptors: Education, Dental. Teaching Methods. Education, Higher. Curriculum.

Análisis de las Directrices Curriculares Nacionales en Odontología a la luz de las metodologías activas: ¿una transformación en curso?

Resumen Este ensayo teórico-reflexivo analiza críticamente las Directrices Curriculares Nacionales (DCNs) de los cursos de Graduación en Odontología, a la luz de las Metodologías Activas de Enseñanza-Aprendizaje (MAEAs). Desde un enfoque cualitativo y reflexivo, se investigan las posibles convergencias entre el dispositivo legal (Resolución CNE/CES nº 3/2021) y diez pilares de las MAEAs, cuyos supuestos constituyen el marco conceptual del estudio: protagonismo y autonomía del estudiante; interacción y comunidad de aprendizaje; reflexión crítica y aprendizaje significativo; respeto al contexto y a la diversidad; valorización del conocimiento previo del educando; desarrollo de competencias socioemocionales como eje de un aprendizaje activo, colaborativo, ético y socialmente comprometido; enfoque investigativo y desafiador, centrado en la vida; integración entre teoría y práctica; tecnologías en diálogo – interacciones entre lo analógico y lo digital en el aprendizaje –; y evaluación formativa y procesual en las trayectorias de aprendizajes innov-activos. La construcción teórico-metodológica de los pilares se fundamenta en referentes de la educación crítica, constructivista, y en la pedagogía histórico-crítica y andragógica, mediante el método de la investigación-acción. Se evidenció la presencia inequívoca de las MAEAs en las DCNs vigentes, como un indicador de avance en los procesos educativos de la formación en Odontología, en todos los pilares analizados. Sin embargo, la efectiva implementación de dichas DCNs requiere no solo modificaciones curriculares, sino también la adopción intencional de metodologías que estimulen la criticidad, favorezcan el protagonismo estudiantil y promuevan una mediación docente emancipadora, articuladas con un compromiso institucional ético y social – lo que demuestra que las instituciones formadoras están, de hecho, viviendo una transformación en curso.

Descriptor: Educación en Odontología. Métodos de Enseñanza. Educación Superior. Currículo.

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Análise das Diretrizes Curriculares Nacionais da Odontologia à luz das metodologias ativas: uma transformação em curso?

Resumo Este ensaio teórico-reflexivo analisa criticamente as Diretrizes Curriculares Nacionais (DCNs) dos cursos de Graduação em Odontologia, à luz das Metodologias Ativas de Ensino-Aprendizagem (MAEAs). A partir de uma abordagem qualitativa e reflexiva, investigam-se as possíveis convergências entre o dispositivo legal (Resolução CNE/CES nº 3/2021) e dez pilares das MAEAs, cujos pressupostos constituem o marco conceitual do estudo: protagonismo e autonomia do educando; interação e comunidade de aprendizagem; reflexão crítica e aprendizagem significativa; respeito ao contexto e à diversidade; valorização do conhecimento prévio do educando; desenvolvimento de competências socioemocionais como eixo da aprendizagem ativa, colaborativa, ética e socialmente comprometida; abordagem investigativa e desafiadora, centrada na vida; integração entre teoria e prática; tecnologias em diálogo – interações entre o analógico e o digital na aprendizagem; avaliação formativa e processual nas trilhas da aprendizagem inov-ativas. A construção teórico-metodológica dos pilares fundamenta-se em referenciais da educação crítica, construtivista, na pedagogia histórico-crítica e andragógica, por meio do método de pesquisa-ação. Evidenciou-se a presença inequívoca das MAEAs nas DCNs vigentes, como indicador de aprimoramento dos processos educacionais na formação em Odontologia, em todos os pilares analisados. Entretanto, a efetivação das referidas DCNs requer não apenas mudanças curriculares, mas também a adoção intencional de metodologias que estimulem a criticidade, favoreçam o protagonismo discente e promovam uma mediação docente emancipadora, articuladas a um compromisso institucional ético e social – o que evidencia que as instituições formadoras estão, de fato, vivenciando uma transformação em curso.

Descritores: Educação em Odontologia. Métodos de Ensino. Educação Superior. Currículo.

INTRODUCTION

This essay investigates the convergence between the Brazilian National Curriculum Guidelines (NCGs) (originally Diretrizes Curriculares Nacionais – DCNs) and the Active Teaching-Learning Methodologies (ATLMs) in undergraduate dental courses, based on Resolution CNE/CES No. 3, of 2021¹. Implementing NCGs presents challenges and perspectives for academic training and faculty qualification due to the required transformations. These changes include overcoming the still predominant technical and procedural model.

These guidelines underscore the dialogue among universities, health services, and society as a key strategy to ensure that professional education effectively responds to social needs². They also highlight the institutional and curricular challenges associated with integrating oral health into the Brazilian Unified Health System (SUS)³, particularly the need to develop innovative teaching-learning processes. Within this context, faculty development becomes essential, supported by courses grounded in critical pedagogy⁴ and curricular adjustments that strengthen the interface between education and public health care⁵. Ethics, interprofessionality, and social commitment emerge as core formative axes, sustained by the integration of teaching, research, and extension⁶. Positive assessments of teaching-service-community integration reinforce this perspective and underscore the relevance of active methodological approaches⁷.

The authors converge in recognizing the need for an educational restructuring that fosters interdisciplinarity, integrates teaching, service, and community, and strengthens faculty competencies. Such transformations demand a renewed professional stance from educators, who must adopt critical, dialogic, emancipatory, and reflective approaches that promote autonomous thinking, ethical awareness, and transformative student engagement in light of the complex demands of the SUS^{2,3-7}. Faculty development thus becomes a decisive factor for the effective implementation of the NCGs. The traditional model, centered on the passive transmission of content, is insufficient to support generalist and ethically grounded practices aligned with the health system. Consequently, active methodologies that cultivate student leadership and meaningful learning are required.

Approaches such as andragogy and the theory of meaningful learning acquire particular relevance, as they posit that adult education must account for learners' autonomy and prior experiences⁸, given that new knowledge is more effectively assimilated when connected to previous understanding⁹. Educational strategies such as the sequential organization of content, the use of diverse languages and formats, and the promotion of autonomy and reflection align with the NCGs and contribute to the formation of critical, ethical, and team-prepared professionals¹⁰. Problem-Based Learning (PBL), for example, facilitates the integration of theory and practice and promotes collaborative learning, provided it is supported by well-structured faculty development and carefully designed problem situations¹¹.

The 2002 NCGs initiated this paradigm shift in dental education, which was further reinforced by the 2021 update. The movement toward ATLMs reflects an institutional effort in response to contemporary demands in health education, although their implementation continues to present challenges for faculty, administrators, and students. This context requires a reexamination of the curriculum, pedagogical practices, and the professor's role as a mediator in the learning process.

This essay has two main objectives. The first is to contribute to the development of the competencies required for professional practice in health within higher education. The second is to offer theoretical and practical elements that support more effective andragogical strategies grounded in ATLMs. We argue that these reflections can help advance an educational model attuned to contemporary needs, one that promotes critical thinking, innovation, and a commitment to ethical and humanized training in accordance with SUS principles.

CURRICULA IN TRANSFORMATION: NCGs, FORMATIVE CHALLENGES, AND EDUCATIONAL INTENTIONALITY

The NCGs have driven significant changes in dental education, aimed at preparing professionals with broadened competencies oriented toward comprehensive care and interprofessional practice within the SUS. This context underscores the importance of interdisciplinary training closely connected to research, continuing education, and public policy.

Although the first Brazilian dental school was founded in 1884 in Bahia, dental education began to align more consistently with public health policies only with the introduction of the NCGs in the early 2000s. These guidelines have since guided a shift away from a biomedical and technical model toward training centered on comprehensive care, interprofessional practice, and integration with the SUS.

Aligned with public health demands and critical education, the NCGs call for curriculum adjustments, the consolidation of constructive teaching practices, the adoption of active methodologies, and faculty development that integrates teaching, service, and society. A timeline illustrates this process (Figure 1), showing the evolution of the NCGs alongside key public policies and historical milestones.

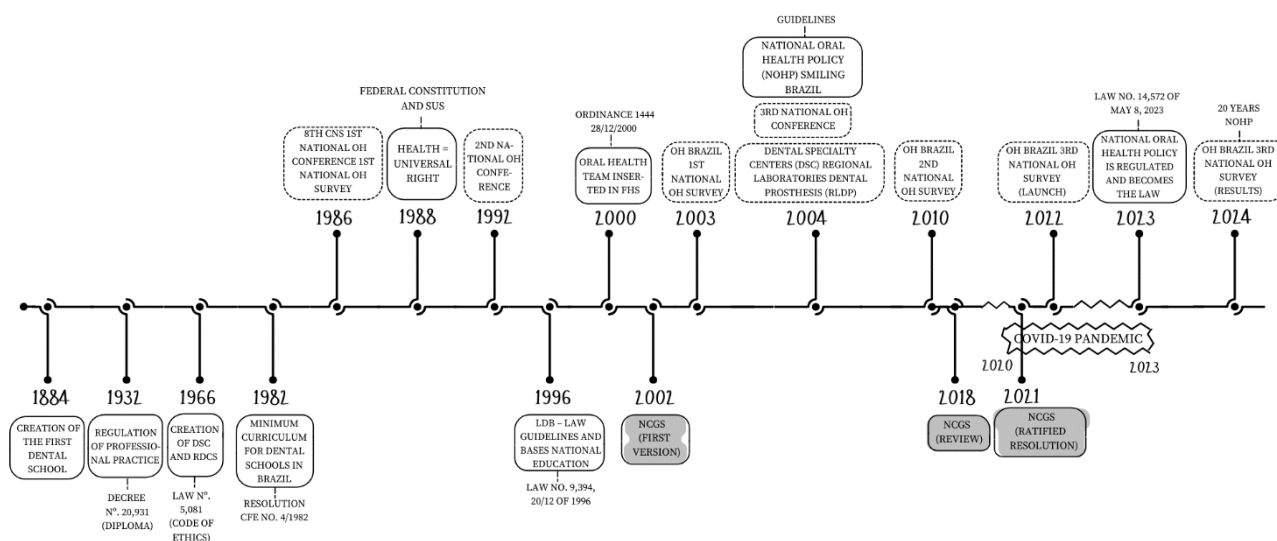


Figure 1. Evolução da regulamentação da formação odontológica em interface com as políticas públicas e marcos históricos no Brasil (1884-2024).

The XXI century still presents key challenges, such as curriculum reform, the persistence of in-person training as the sole model for dental education, faculty development, student engagement, and the definition of educational intentionality (educating for what and for whom?). These issues directly relate to the problem discussed in this article and underscore that this transformation remains ongoing.

Resolution CNE/CES No. 3/2002 marked a turning point by defining a new profile for dental surgeons—generalist, humanistic, critical, reflective, and oriented toward comprehensive care, evidence-based decision-making, and lifelong learning. Yet technical practices¹² and institutional resistance to this model remain, alongside ongoing difficulties in articulating dental training institutions with the SUS.

At the same time, important efforts have been undertaken. Institutions such as the Brazilian Dental Education Association (ABENO), in partnership with the Ministry of Health and the Pan American Health Organization (OPAS)¹³, have promoted initiatives like Pró-Saúde, PET-Saúde, and GraduaCEO, which aim to strengthen the integration of teaching, service, and community. Despite these advances, these programs continue to face institutional resistance and limited adoption of innovative proposals.

Updates to NCGs express an ongoing effort to redirect dental education, but their effectiveness depends on an institutional commitment capable of sustaining innovative educational practices, curriculum flexibility, and critical faculty mediation. Overcoming the fragmentation of knowledge, integrating teaching, research, and extension, and effectively inserting students into real-world scenarios require a critical understanding of the purposes of higher education. Understanding why, what, and how we design teaching-learning should guide educational intentions consistent with critical, interdisciplinary, and socially compromised training^{14,15}.

ACTIVE METHODOLOGIES: FUNDAMENTALS, CRITICISM, AND TRANSFORMATIVE POSSIBILITIES

The incorporation of ATLMs into dental education has intensified in response to the transformations required by NCGs and the contemporary challenges of health education. This transition from traditional teaching to more participatory and critical practices demands repurposing the teaching role, strengthening pedagogical mediation, and appreciating student autonomy^{16,17}. Based on andragogy, a theory aimed at adult learning that recognizes the student's previous experience, internal motivation, and autonomy⁸, ATLMs have a broad theoretical basis, with contributions from authors such as Paulo Freire (2000)^{18,19}, Dermeval Saviani (2019)²⁰, John Dewey (1979)²¹, and Lev Vygotsky (1992)²².

The concept of *active learning* has effectively increased student engagement and performance, especially in solving complex problems²³. Strategies such as Problem-Based Learning (PBL), case studies, and simulations favor critical thinking and reflective analysis²⁴. In turn, meaningful learning relies on emotional aspects and concrete experiences²⁵. In Brazil, ATLMs are supported by the Law of Guidelines and Bases of National Education (LDB) (Law No. 9.394/1996), which guides inclusive, autonomous, and integrative practices, breaking with exposition models and valuing critical mediation in teaching^{26,27}. Digital technologies strengthen skills such as creativity and criticality. They expand connections with contemporary digital culture^{28,29}. In health education, such approaches align with the pedagogies of Freire and Saviani by promoting emancipatory and socially engaged practices^{18,19}, contributing to the formation of critical subjects and the strengthening of SUS.

However, ATLMs are not free of criticism. Authors^{30,31} who share the perspective of historical-dialectic materialism argue that, when appropriated acritically, these methodologies may be linked to functionalist educational projects aimed at adapting individuals to market demands, with the devaluation of faculty mediation and emphasis on pragmatic solutions. This use may generate knowledge fragmentation, technical training, and the depoliticization of the educational process, becoming subordinate to the logic of productive restructuring of late capitalism³⁰.

Considering these criticisms, it must be reaffirmed that ATLMs are not a homogeneous model. Their emancipatory potential depends on the theoretical and political foundations that support their implementation. When integrated into critical pedagogical projects and committed to social justice, these methodologies promote the ethical, reflective, and integrated training of autonomous and socially engaged individuals. From this perspective, the educator acts as a critical mediator and integrator of knowledge, valuing prior knowledge, territory, and learning community as relevant educational axes.

The andragogical proposal employed in this study is anchored in ten ATLM structuring pillars: (1) Student Protagonism and Autonomy; (2) Interaction and Learning Community; (3) Critical Reflection and Meaningful Learning; (4) Respect for Context and Diversity; (5) Appreciation of the Student's Prior Knowledge; (6) Development of Socio-Emotional Skills as the axis of active, collaborative, ethical, and socially committed learning; (7) Investigative and Challenging Life-Centered Approach; (8) Integration between Theory and Practice; (9) Dialogue between Technologies – interactions between analog and digital in learning; and (10) Formative Assessment in the "Innov-Active" Learning tracks, a term coined by Filatro and Cavalcanti (2023)³² to designate educational practices that integrate innovation and active methodologies, focusing on transforming teaching-learning processes¹⁴⁻¹⁷.

These pillars were systematized as a conceptual framework based on a consolidated action research path, based on theoretical studies, teaching practices, and institutional experiences developed in postdoctoral internships from the Graduate Program in Public Health of the Federal University of Santa Catarina (PPGSC-UFSC), approved by the Research Ethics Committee under opinions No. 2,651,306 (2018-2020) and No. 6,698,568 (2024-2025). A theoretical-methodological construction was applied in two subjects of the undergraduate dental course, four subjects of graduate dental and collective health courses, and five extension projects that integrated teaching, service, and community^{16,17,33}.

Thus, this theoretical-reflective essay expresses a commitment to educational innovation in dental training, anchored in critical references, constructivism, the centrality of students as active individuals, and professors as critical-ethical mediators and learning articulators.

CONVERGENCES BETWEEN ACTIVE METHODOLOGIES AND NCGs: FUNDAMENTALS FOR CRITICAL AND TRANSFORMATIVE DENTAL EDUCATION

This section proposes an integrated analysis of ATLM pillars and the provisions of Resolution CNE/CES No. 3/2021, which governs the NCGs for undergraduate dental courses.

These fundamentals converse directly with the normative provisions of the NCG/2021, especially regarding general competencies (Article No. 3), health care (Article No. 5), specific competencies (Chapter III, item VII), educational organization (Articles No. 12 and 15), and curriculum structure (Articles No. 17 and 19).

The intersection of these dimensions reveals that ATLMs support the principles of NCGs and leverage them by driving a critical-reflective, integrated, and transformative formative process. Subsequently, the relationship between the ten ATLM pillars and the provisions of Resolution CNE/CES No. 3/2021 (Figure 2) is developed in text to explain these convergences and offer concrete resources to professors. It suggests didactic-educational strategies linked to each pillar, helping to improve andragogical practice and dental training qualification.

Student protagonism and autonomy: paths to emancipatory and active training

ATLMs promote student leadership as a central element of an emancipatory formation. In this model, students are active individuals in the formative process. They assume responsibilities, exercise autonomy, and build knowledge through dialogue, critical reflection, and collaborative participation. Strategies such as PBL, inverted classroom, reflective portfolios, and *design thinking* benefit the development of skills such as investigative curiosity, critical thinking, communication, and decision-making. Professors act as mediators in ethical and participatory environments. They value previous knowledge and promote meaningful learning.

This student protagonism dialogues with the NCGs, especially Article No. 3, which leans toward a generalist, critical, ethical, and autonomous training committed to the social needs and principles of SUS. The guidelines emphasize the integration of theory and practice, respect for diversity, and the fostering of future dental surgeons' reflective and humanistic performance. Thus, protagonism and autonomy are indispensable foundations for constructing transformative education, whose impacts extend to healthcare quality and the strengthening of social commitment in dentistry.

ATLM Pillars	(1) Student Protagonism and Autonomy	(2) Interaction and Learning Community	(3) Critical Reflection and Meaningful Learning	(4) Respect to Context and Diversity	(5) Appreciation of Previous Knowledge	(6) Socio-emotional Skills (collaborative and affective)	(7) Investigative and Challenging (life centered)	(8) Integration between Theory and Practice	(9) Digital and Analog Technologies	(10) Formative Assessment
NCGs 2021 CNE/CES Nº. 3 (Chapters)	Chapter I – On the Guidelines: Article 3, items I to VII	Chapter II – On the General Skills: Sole Paragraph	Chapter II – Section I – On Health Care: Article 5, items I to V	Chapter III – On the Specific Skills: item VII	Chapter IV – On the Pedagogical Project of the Undergraduate Dental Course: Articles 12 and 15	Chapter IV – On the Curricular Structure and Curricular Contents: Articles 17 and 19				
NCGs 2021 CNE/CES No. 3 (Synthesis of chapters)	Graduates must be generalist professionals with a solid technical-scientific training, capable of working in a humanistic and ethical manner. They must also be capable of working in teams, be proactive, entrepreneurial, communicative, critical, and reflective. Finally, they must be aware and participative in social and health matters.	It defines that the general skills to be developed by graduates include the ability of mobilizing knowledge and skills in practical situations, promoting the training of professionals capable of adequately responding to public health and society demands.	It presents the objectives of dental surgeon training, which must (I) acknowledge health as a human right and act according to the principles of the Unified Health System (SUS); (II) develop health promotion, protection, and recovery actions; (III) work in an interprofessional and interdisciplinary manner; (IV) relate to the social and cultural context of individuals; promoting the humanization of care; and (V) humanization and stimulus for self-care and user autonomy	It highlights that graduates must be able to participate in scientific investigations, as well as promote critical thinking and the search for new health-related knowledge.	They emphasize that the Pedagogical Project must focus on students as the learning subjects, and professors working as facilitators. It must also contribute to the understanding and preservation of local culture and practices, respecting diversity and promoting integral student training. To implement a continuous faculty training program.	They address the curricular structure, which must meet the population's health needs, integrating theory and practice. The training must include active methodologies and attribute at least 50% of the class load to practical activities, ensuring an education that will prepare graduates for the reality of professional exercise in dentistry.				
NCGs & ATLMs (Convergences)	Pillars 1 to 10, focusing on pillar 1.	Pillars 1 to 10, focusing on pillars 2 and 6.	Pillars 1 to 10, focusing in pillars 4 and 7.	Pillars 3 and 7	Pillar 8	Pillars 1 to 10, focusing on pillars 1, 5, and 8.				

Figure 2. Convergences between the Pillars of Active Teaching-Learning Methodologies and the National Curriculum Guidelines.

Interaction and Learning Community: paths for constructing collaborative, socio-emotional, dialogical, and inclusive knowledge

Interaction is an essential pillar of ATLMs. It enables building collective knowledge in collaborative and inclusive learning communities. In contexts mediated by digital technologies and active methodologies, interaction promotes autonomy, problematization, and joint reflection. These processes favor student engagement and deepen learning, especially when structured in epistemological, social, and affective dimensions³⁴. Anchored in Freirian and Habermasian perspectives, learning communities are ethical-political spaces for horizontal dialogue, co-responsibility, and social transformation. In these spaces, active listening, diversity, and teacher-student co-authorship are conditions for meaningful learning³⁵.

The NCGs, especially Chapter II, sole paragraph, emphasize teamwork training, a skill directly developed in ATLMs. Active methodologies articulate interaction, socio-emotional skills, and cooperation. They help form professionals committed to SUS, capable of acting ethically, empathically, and collaboratively in response to the complex demands of collective health.

Critical reflection and meaningful learning: from building sense to producing knowledge

ATLMs value critical reflection and meaningful learning as essential pillars in training ethical, autonomous, and transformative professionals. Based on authors such as Ausubel (1968)⁹, Freire (2000)^{18,19}, and Schön (2000)³⁶, these methodologies favor dialogical and investigative environments that challenge students to repurpose knowledge from the experienced reality.

Ausubel's meaningful learning theory emphasizes that assimilation occurs when new knowledge connects to previous knowledge. Freire (2000)^{18,19} and Schön (2000)³⁶ defend reflection as a transformative practice and propose reflective actions (describe, inform, confront, and reconstruct) that foster critical thinking and emancipation.

Strategies such as PBL, conceptual maps, reflective diaries, and computer modeling promote student autonomy and protagonism, transforming them into active individuals of knowledge production.

The NCGs (Ch. III, item VII) reinforce the relevance of scientific, investigative, and critical training, articulating theory and practice based on reality. ATLMs integrate reflection, significance, and research, promoting learning that is contextualized, collaborative, and committed to social transformation.

Respect for context and diversity: weaving an ethical, inclusive, and social transformation-committed curriculum

ATLMs contribute to curricula that are contextualized, inclusive, and sensitive to students' socio-cultural realities. The curriculum should be conceived as a political and historical space where cultural diversity is recognized as a pedagogical force that promotes social justice and reduces inequalities. This proposal aligns with the social reconstructionist curriculum, committed to collectivity and transformation³⁷.

Acknowledging students' experiences and knowledge enhances engagement and favors more meaningful educational practices. Strategies such as projects, interviews, reflective diaries, and collaborative work expand listening, promote leadership, and develop socio-emotional skills, such as empathy and sensitivity²⁷.

The NCGs (Chap. II, Art. 5) highlight the need to consider social and cultural contexts in health training. ATLMs promote the appreciation of differences and dialogue with local reality. They enable the training of ethical, critical, and prepared professionals to act in a sensitive and transformative manner in diverse contexts, strengthening the social commitment of health education.

Appreciation of students' prior knowledge: from the lived experience to constructing new knowledge

ATLMs recognize prior knowledge as a starting point for building meaningful learning. Based on Ausubel's theory⁹, ATLMs value student knowledge from their social, cultural, and formative experiences. These methodologies understand such experiences as cognitive anchors (subsumers) that facilitate the assimilation of new content³⁸.

This knowledge must be accepted and problematized in a dialogical and critical manner. The lack of linkage between prior knowledge and new content may compromise learning³⁸. ATLMs address this challenge using strategies such as conceptual maps, problem-solving, dialogued classes, narratives, and mentoring, which makes the process more participatory and contextualized.

The sole paragraph of Chapter II of the NCGs underscores the importance of applying knowledge and skills based on the needs of society and the SUS. ATLMs connect content with experience, enhance engagement, and promote critical, reflective, and transformative education, which is essential to health education centered on individual reality.

Development of socio-emotional skills as an axis of active, collaborative, ethical, and socially committed learning

ATLMs are a fertile ground for developing socio-emotional skills, such as empathy, critical solidarity, cooperation, lovingness, resilience, active listening, and communication. These skills are essential to integral and humanized training. The author emphasizes that these skills should not be developed in isolation but integrated into everyday pedagogical practices. Methodologies such as PBL, problematization, interdisciplinary projects, group dynamics, and conversation circles may enhance these skills³⁹.

Solidarity projects also prove effective, especially in challenging contexts such as the pandemic, by articulating academic content with ethical and social actions, strengthening students' commitment to collectivity⁴⁰.

The NCGs (Ch. II, sole paragraph) recognize the socio-emotional skills as essential to the critical, collaborative, and ethical performance of SUS health professionals. ATLMs favor cooperative, reflective, and emotionally safe training environments. They help develop sensitive and resilient subjects prepared to deal with the complexity of human relations and contemporary health challenges. Integrating these skills into the curriculum is a condition for transformative, affective, effective, and socially responsible education.

Investigative and challenging life-centered approach: training for autonomy, criticality, and transformation in health

ATLMs conversing with the principles of andragogy⁸ promote an investigative and challenging approach focused on the real experiences of adult learners. Knowles (1980)⁸ and other contemporary authors⁴¹ highlight that adults learn based on concrete needs, intrinsic motivation, and previous experiences. This approach values the diagnostic survey of knowledge and its construction by solving authentic problems with a link between theory and practice.

ATLMs enhance this perspective by integrating strategies, such as interdisciplinary projects, case studies, problematization, PBL, and situated textual production, which stimulate autonomy, critical thinking, and collaboration. In health education contexts, acknowledging students' personal and professional trajectories strengthens the link between academic content and everyday social life challenges.

Resolution CNE/CES No. 3/2021 (Ch. II, Article No. 5) reinforces this approach by proposing training methods aligned with the needs of SUS and society. ATLMs stimulate investigations anchored in reality, preparing reflective, ethical, and innovative professionals. This integrated, transformative curricular perspective is essential to training individuals capable of critically intervening with the multiple scenarios of health care and social transformation.

Integration between theory and practice: student leadership and respect for diversity as pathways to transformative education

The integration between theory and practice is a structuring principle of ATLMs. It is essential to train critical and ethical professionals who are prepared for the challenges of a sometimes complex and contradictory social reality. Some authors⁴² evidence that this articulation should occur from the beginning of training, especially through supervised stages, interdisciplinary projects, and reflective practices.

Reflecting in and about the action is a fundamental axis for constantly repurposing teaching practices⁴³. Integrated practices that mobilize reason, emotion, and embodiment are also essential, as advocated by authors anchored in Moran (2013)⁴⁴. Additionally, experiences in real contexts, such as those provided by the Health and Citizenship Project, consolidate contextualized and critical learning, especially when supported by active methodologies¹⁵.

The NCGs (Articles 12 and 15) affirm the relevance of theory-practice integration in the Course Educational Project. ATLMs promote this articulation in real situations, favoring student protagonism and respect for diversity. They consolidate meaningful and inclusive training committed to social transformation and health promotion within the SUS.

Dialogue between technologies: interactions between analog and digital in learning

ATLMs are not defined by the simple use of technologies but by the educational intentionality in the construction of meaningful, reflective, and contextualized learning. Methodologies such as PBL, Problematization, Case Study, and Project Learning precede the digital age and have historically been supported by analog resources, such as concept maps, debates, interviews, and experiments⁴³. Therefore, digital technologies must be incorporated into educational planning in a critical and articulate manner, expanding the possibilities of customization, collaboration, and formative assessment.

Several authors advocate for the integrated coexistence of digital and analog technologies^{43,44}. Photography teaching, for instance, shows how the combination of traditional features, such as analog cameras and chemical development, with digital tools, such as image editors and multimedia projections, may favor investigative, sensory, and autonomous learning⁴³. Conversely, professor-mediated spaces where cell phones, Web 2.0 platforms, dramatizations, and games coexist stimulate student authorship and criticality⁴⁴.

The potential of digital environments is evidenced in the use of *Learning Analytics* as a formative monitoring tool, enabling personalized educational interventions on platforms such as Moodle. However, pedagogical planning still requires analog resources and human interactions to ensure their consistency⁴⁵. Although digital technologies are widely widespread, their application in teaching is still often restricted to expository functions. That reinforces the need for faculty training anchored in the TPACK model, which integrates technological, pedagogical, and content knowledge for true pedagogical integration⁴⁵.

Particularly in articles focused on contemporary training, NCGs indicate the relevance of technological integration as a means of forming critical, collaborative, and prepared individuals for the ethical and innovative exercise of the profession. ATLMs dialogue with digital and analog technologies, and build dynamic, interactive, and humanized educational environments. In these environments, technologies are combined with autonomy, meaningful learning, and social commitment.

Therefore, educational intentionality should guide the conscious and articulate use of technology. Its function is not to replace educational practice but to enhance it, favoring the training of professionals capable of innovating, adapting, and interacting critically with the transformations of the XXI century.

FORMATIVE AND PROCEDURAL ASSESSMENT ON THE INNOV-ACTIVE LEARNING TRACKS

Formative assessment, also called mediator or procedural, is one of the ATLM pillars. It promotes student leadership, continuous learning, and pedagogical transformation. Several authors defend a conception of formative assessment centered on active listening, qualified feedback, and continuous monitoring of the educational process. Highlighted contributions include those of Jussara Hoffmann (2014)⁴⁶, Philippe Perrenoud (2001)⁴⁷, and Cipriano Luckesi (2008)⁴⁸, who value the ethical, dialogical, and procedural character of the evaluation.

A meaningful assessment must consider the students' real work and promote contextualized learning⁴⁷. In this sense, the evaluation proposal highlights instruments such as self-assessment, co-assessment, and reflective dialogue. These instruments favor self-regulation and metacognition. This perspective is broadened by conceiving the evaluation as a humanizing mediation that respects students' singularities⁴⁶. However, challenges still remain, as revealed by tensions between theory and practice, where traditional methods resist even in contexts with pedagogical proposals focused on training practices. These findings highlight the urgent need for critical faculty development that can support assessment practices consistent with ATLMs¹⁷.

Article No. 12 of the NCGs highlights procedural evaluation as the central axis of training, which integrates with ethical, technical, and intellectual development. Continuous integrated formative assessment strengthens cognitive and socio-emotional skills, promotes critical thinking, and helps train autonomous ethical individuals prepared for the challenges of contemporary life.

The articulation between ATLM pillars and NCG devices shows its strength as a critical, reflective, and transformative formative strategy. For these methodologies to avoid becoming superficial or merely instrumental, they must be grounded in emancipatory educational intentions, robust faculty development, and strong institutional commitment. This convergence reaffirms the potential of ATLMs to consolidate ethical, inclusive, and SUS-aligned curricula, as well as the need for a critical and innovative educational culture, paving the way for the final considerations that deepen the development and challenges of this formative journey.

FINAL CONSIDERATIONS

The unequivocal presence of ATLMs in current NCGs was demonstrated as an indicator of educational process improvement in dental training, in all analyzed pillars. However, its effectiveness requires more than curriculum changes; it demands methodologies that stimulate criticality, student leadership, and social commitment. In line with health education guidelines, ATLMs value meaningful learning and the integration between theory and practice. However, their depoliticized application may reduce emancipatory potential, rendering them technical instruments in neoliberal logic. The absence of critical faculty mediation and collective projects may broaden inequalities and weaken ethical training.

Therefore, it is reaffirmed that these methodologies will only be effectively transformative if integrated into political-pedagogical projects committed to social justice and the strengthening of the SUS. Formative assessment, critical use of technologies, and real-world practice scenarios are vital to building ethical, autonomous, and socially engaged subjects.

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