# TECHNOLOGY-MEDIATED EDUCATION IN BRAZILIAN GOVERNMENT PLATFORMS: A COMPARATIVE STUDY BETWEEN THE VIRTUAL ENVIRONMENTS AVASUS AND AVAMEC

EDUCAÇÃO MEDIADA POR TECNOLOGIAS EM PLATAFORMAS GOVERNAMENTAIS BRASILEIRAS: UM ESTUDO COMPARATIVO ENTRE OS AMBIENTES VIRTUAIS AVASUS E AVAMEC

EDUCACIÓN MEDIADA POR TECNOLOGÍA EN PLATAFORMAS GUBERNAMENTALES BRASILEÑAS: UN ESTUDIO COMPARATIVO ENTRE LOS ENTORNOS VIRTUALES AVASUS Y AVAMEC

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ABSTRACT: This study aimed to comparatively analyze two Brazilian public Virtual Learning Environments (VLE), AVASUS, linked to the Ministry of Health, and AVAMEC, linked to the Ministry of Education, identifying their potential, limitations, and contributions to Technology-Mediated Education. The research, qualitative and descriptive in nature, was developed between May and September 2025, based on document analysis and direct observation of the platforms. Aspects such as pedagogical structure, usability, accessibility, thematic relevance, and social impact were examined, considering the institutional objectives and user profile of each environment. The results revealed that AVASUS stands out for its pedagogical effectiveness, coherence with health training policies, and better cost-benefit ratio per certified student, while AVAMEC presents greater thematic diversity, broader reach, and strong social impact on teacher training. Both demonstrate advances in the democratization of knowledge but face challenges related to full accessibility and optimization of the mobile experience. It is concluded that strengthening these platforms requires continuous innovation and articulated public policies, aiming at the consolidation of a quality, inclusive, and sustainable public digital education in Brazil.

Keywords: Technology-mediated education. Virtual learning environments. Avasus x Avamec.

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**RESUMO:** O presente estudo teve como objetivo analisar comparativamente dois Ambientes Virtuais de Aprendizagem (AVA) públicos brasileiros, o AVASUS, vinculado ao Ministério da Saúde, e o AVAMEC, vinculado ao Ministério da Educação, identificando suas potencialidades, limitações e contribuições para a Educação Mediada por Tecnologias. A pesquisa, de natureza qualitativa e caráter descritivo, foi desenvolvida entre maio e setembro de 2025, com base em análise documental e observação direta das plataformas. Foram examinados aspectos como estrutura pedagógica, usabilidade, acessibilidade, relevância temática e impacto social, considerando objetivos institucionais e perfil dos usuários de cada ambiente. Os resultados revelaram que o AVASUS se destaca pela sua efetividade pedagógica, coerência com políticas de formação em saúde e melhor relação custo-benefício por aluno certificado, enquanto o AVAMEC apresenta maior diversidade temática, amplitude de alcance e forte impacto social na formação docente. Ambos evidenciam avanços na democratização do conhecimento, mas enfrentam desafios relacionados à acessibilidade plena e à otimização da experiência móvel. Conclui-se que o fortalecimento dessas plataformas exige inovação contínua e políticas públicas articuladas, visando à consolidação de uma educação digital pública de qualidade, inclusiva e sustentável no Brasil.

**Palavras-chave:** Educação mediada por tecnologias. Ambientes virtuais de aprendizagem. Avasus x Avamec.

**RESUMEN:** Este estudio analizó comparativamente dos Entornos Virtuales de Aprendizaje (EVA) públicos brasileños: AVASUS, vinculado al Ministerio de Salud, y AVAMEC, vinculado al Ministerio de Educación. Se identificaron su potencial, limitaciones y contribuciones a la Educación Mediada por Tecnología. La investigación cualitativa y descriptiva se realizó entre mayo y septiembre de 2025, mediante análisis documental y observación directa de las plataformas. Se examinaron aspectos como la estructura pedagógica, la usabilidad, la accesibilidad, la relevancia temática y el impacto social, considerando los objetivos institucionales y el perfil de usuario de cada entorno. Los resultados revelaron que AVASUS destaca por su efectividad pedagógica, coherencia con las políticas de formación en salud y una mejor relación costo-beneficio por estudiante certificado, mientras que AVAMEC presenta mayor diversidad temática, un alcance más amplio y un fuerte impacto social en la formación docente. Ambos entornos demuestran avances en la democratización del conocimiento, pero enfrentan desafíos relacionados con la accesibilidad total y la optimización de la experiencia móvil. Se concluye que el fortalecimiento de estas plataformas requiere innovación continua y políticas públicas coordinadas, orientadas a la consolidación de una educación digital pública de alta calidad, inclusiva y sostenible en Brasil.

**Palabras clave:** Educación mediada por tecnología. Entornos virtuales de aprendizaje. Avasus x Avamec.

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## INTRODUCTION

At the dawn of the 21st century, Virtual Learning Environments (VLEs) emerge as essential tools for achieving the democratization of access to knowledge in an increasingly connected modern society. With the growing and disordered demand for distance education in Brazil (1), often evidenced by governmental and academic initiatives, the importance of

platforms capable of integrating technological innovation and pedagogical quality is reinforced (2).

In this context, the Virtual Learning Environment of the Unified Health System (AVASUS) (3), a distance education platform created by the Ministry of Health (MS) in partnership with the Federal University of Rio Grande do Norte (UFRN), through the Laboratory of Technological Innovation in Health (LAIS/UFRN) and the Secretariat of Distance Education (SEDIS/UFRN), and the Virtual Learning Environment of the Ministry of Education (AVAMEC) (4), promoted by the Ministry of Education (MEC), in partnership with the Federal University of Goiás (UFG), through the Laboratory of Information Technology and Educational Media (LabTIME), stand out nationally as two of the most relevant national systems in technology-mediated training for professionals in different areas.

It is relevant to mention, firstly, the independence and commitments involved in this teaching and learning process compared to the face-to-face format. Secondly, the various technological means, and thirdly, the physical separation between teacher and student, which increases the commitment to learning (5,6). According to (7) an adoption that began timidly, about 15 years ago, currently distance education, due to its interaction possibilities, is the preferred modality for higher education students in Brazil.

From this perspective, both environments aim to offer accessible and comprehensive training, however they differ in terms of target audience, instructional design and pedagogical strategies adopted. AVASUS (8) emphasizes the improvement of skills in the health area, seeking to meet the demands of the Unified Health System (SUS), AVAMEC (9,10) presents a broader approach, with topics ranging from teacher training to strengthening skills in public management.

These differences raise crucial questions: how does each platform position itself in relation to the needs of its users? In what way can these tools contribute to improving distance education in Brazil? This article investigates these questions, comparing the strengths and limitations of each platform. Based on the survey of their functionalities, it aims to discuss how VLEs can be improved to expand access to quality education.

In Brazil, VLEs play a strategic role in expanding access to distance education (1) meeting the demands for continuing education and lifelong learning in essential sectors such as health and education (6,11–14). The study indicates the possibility of integrating or complementing AVASUS and AVAMEC, exploring synergies that can expand the social and

educational impact of the platforms. In short, given the contemporary scenario marked by the acceleration of digital transformation, understanding the potential and challenges of these technologies is fundamental to outlining paths that strengthen educational processes in their teaching contexts.

## METHODS

The investigation was carried out by the authors and took place between May and September 2025, conducted from a qualitative approach, of an exploratory and descriptive nature, with the aim of carrying out a comparative study on technology-mediated education in Brazilian government learning platforms, namely AVASUS (3) and AVAMEC (4). The choice of this approach is justified by the nature of the object of study, which involves understanding aspects related to usability, accessibility, functionalities and social impact, elements that cannot be fully captured by exclusively quantitative methods.

The data collection process took place in two complementary stages. The first consisted of document analysis, including the review of information available on the official portals of the platforms, as well as institutional documents produced by the Ministry of Health (SUS) and the Ministry of Education (MEC). This stage allowed us to identify the purposes, the target audience, the pedagogical conception and the support policies related to each virtual learning environment.

In the second stage, the practical use of the platforms was carried out. The evaluation was structured around five main criteria: (i) usability, considering ease of navigation and intuitive interface; (ii) functionalities, encompassing interactive resources and support for the learning process; (iii) content, analyzed in terms of the diversity, quality and relevance of the courses offered; (iv) accessibility, with emphasis on adaptation for mobile devices and the presence of inclusive resources; and (v) target audience and impact, verifying geographic reach, social relevance and suitability to the demands of different user profiles.

## THEORETICAL FOUNDATION

By definition, Virtual Learning Environments (VLEs) are technological platforms designed to mediate and enhance teaching and learning processes, allowing interactions between teachers, students and content in a digital space (13–15). According to (16,17), VLEs are

digital ecosystems that integrate pedagogical tools and resources to facilitate knowledge construction, information exchange and monitoring of educational progress.

According to (14), a VLE combines elements of Information and Communication Technology (ICT) to provide interactive and personalized educational experiences. Common examples include platforms such as Moodle, Blackboard, Canvas and Google Classroom (18,19) that offer robust functionalities for academic management, content delivery and assessment. These environments are widely used in different teaching modalities, especially in Distance Education (DE), due to their ability to transcend spatial and temporal limitations (1,2,13).

Virtual Learning Environments (VLEs) are fundamental tools in contemporary education, as they integrate technological resources and pedagogical practices aimed at expanding and making teaching and learning processes more flexible (14). These platforms reconfigure the role of teachers and students, promoting new dynamics of interaction, autonomy and collaboration in the digital educational space (15,17).

Among the characteristics that, according to (15), make VLEs indispensable in the current educational scenario, the following stand out: flexibility, which allows access to learning materials and activities at any time and place, adapting to the needs of students; interactivity, made possible by forums, chats, video conferences and collaborative activities; and personalization, which allows the creation of learning paths adapted to the profile and pace of each participant (5,13).

Other relevant characteristics, according to (6,13,14), include efficient content management, with organization and sharing of materials in multiple formats (videos, texts, audios and interactive questionnaires); monitoring and evaluation mechanisms, which allow monitoring student performance and providing continuous feedback; and integration with other technologies, such as mobile applications, social networks and videoconferencing systems, expanding the possibilities of communication and educational engagement.

In addition to technical and pedagogical characteristics, VLEs offer a number of educational benefits. Among them (7,19) they highlight expanded access to education, which favors the democratization of education and the inclusion of students in remote regions or with mobility restrictions. Such environments stimulate autonomous learning, developing skills related to self-management, organization and problem solving. Which, according to (5), also contributes to cost reduction, by minimizing expenses with travel, physical infrastructure and printed materials.

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Additionally, VLEs drive pedagogical innovation, (15,16) by favoring the use of active methodologies, such as the flipped classroom and project-based learning, and promote digital inclusion, stimulating the development of technological skills among students and teachers (13).

However, the adoption of VLEs involves significant challenges (17,20) that need to be addressed to ensure their full pedagogical potential (18). Among these challenges are unequal access to technological infrastructure and connectivity, which limits the participation of students from vulnerable socioeconomic backgrounds; and digital literacy, since the effective use of platforms requires technological skills that not all users possess.

There are also issues related to student engagement (13,16), considering that the absence of face-to-face interaction can generate feelings of isolation and demotivation, and to teacher overload, resulting from the demands of methodological adaptation and the need for continuing education. Other challenges (17,19) include data security and privacy, which require rigorous information protection policies, and the maintenance and technological updating of platforms, which require ongoing investments in infrastructure, support and training.

Virtual Learning Environments represent strategic tools for the transformation of contemporary education, enhancing innovative pedagogical practices and expanding the reach of academic and continuing education. However, their success depends on public policies (21,22) that mitigate technological inequalities and strengthen the digital training of educators and students (15). It is through integrated efforts between government, educational institutions and the academic community that it will be possible to overcome the identified challenges and fully explore the educational potential of VLEs.

## RESULTS AND DISCUSSION

## AVASUS: ORIGIN, PURPOSE, STRUCTURE, CONTRIBUTIONS AND RELEVANCE

The Virtual Learning Environment of the Unified Health System (AVASUS) (3) is an initiative linked to the Ministry of Health, developed in partnership with the Laboratory of Technological Innovation in Health (LAIS/UFRN) and the Secretariat of Distance Education (SEDIS/UFRN), of the Federal University of Rio Grande do Norte (UFRN). Created in 2015, it integrates the Open University System of the SUS (UNA-SUS) and its central purpose is to promote the continuous training of health professionals and the dissemination of knowledge to users of the Unified Health System (SUS), strengthening public policies for continuing education in the health area (3).

It offers self-instructional, free and certified courses, covering various topics related to primary care, health management, sanitary surveillance, public health, rehabilitation and humanization of care. The courses have a dialogical language, composed of various educational resources including video lessons, support texts, interactive activities with feedback, discussion forums, among others, favoring autonomous and collaborative learning. AVASUS' target audience includes healthcare professionals and managers, students, and the general public interested in improving their knowledge.

With over 1.4 million registered users as of September 2025 and nearly 4.0 million enrollments completed (Chart 2), AVASUS (3) has established itself as one of the largest educational initiatives in health in the Americas. According to (23), AVASUS is the third largest human training platform in health in the world, the first being the World Health Organization (WHO) platform and the second being the Pan American Health Organization (PAHO) platform.

AVASUS's motto, "Free and open knowledge in health," translates its mission to make learning accessible and inclusive, stimulating the development of a community of practice among SUS professionals. In addition to its structuring role in continuing health education, AVASUS has been a strategic instrument in addressing public health crises, such as dengue and Zika virus epidemics, the COVID-19 pandemic, as well as syphilis and rare diseases, highlighting its social and technological relevance in Brazil (3).

## AVAMEC: ORIGIN, PURPOSE, STRUCTURE, CONTRIBUTIONS, AND RELEVANCE

The Ministry of Education's Virtual Learning Environment (AVAMEC) (4) was launched in 2018 by the Ministry of Education (MEC), with the objective of offering initial and continuing training in different areas of knowledge, especially in basic education, social inclusion and public management (4). It acts as a repository and educational Hub that centralizes courses and materials produced by the MEC and partner institutions, promoting the democratization of education mediated by technologies (6,9).

With the institutional motto, "An environment where everyone feels welcome and empowered to explore, learn and grow", AVAMEC reflects the proposal to promote a diverse and inclusive community, based on accessibility and digital equity. It provides interactive tools, such as discussion forums, quizzes, performance reports and multimedia materials, aimed at

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active learning and student autonomy. Its target audience includes teachers, school administrators, public servants and citizens interested in educational and social issues.

The relevance of AVAMEC to Brazilian education is remarkable. According to (24,25), it has contributed to the democratization of teacher training, overcoming geographical and financial barriers, as well as promoting the adoption of emerging technologies, such as artificial intelligence, in educational processes. Thus, with more than 2.7 million registered users by September 2025 and almost 8.0 million enrollments (table 2), AVAMEC (4) has consolidated itself as a fundamental pillar in the qualification of teachers and school managers, favoring the continuous improvement of the quality of public education in Brazil.

## Comparison between the Historical Development Context of the environments

The Virtual Learning Environments, AVASUS (3) and AVAMEC (4), are digital platforms, developed with the aim of democratizing access to training and professional development in Brazil (2,7,13,22).

AVASUS (3) was created by the Ministry of Health (MS) as part of a strategy to qualify health workers and strengthen the Unified Health System (SUS). Its development is aligned with the need to meet the demands for continuous training and the regional diversity of Brazil (8,11,26–28). It is characterized by offering free, self-instructional online courses on a variety of health topics, such as syphilis and other STIs (Sexually Transmitted Infections), COVID-19, rare diseases (especially Amyotrophic Lateral Sclerosis – ALS), primary health care (PHC), accessibility, Health Management, Health Surveillance, Elderly Health, Prison System, Preceptorship (training professionals for teaching practice), training for community health agents and those combating endemic diseases, public policies, telehealth, and even Lato Sensu Specialization Courses.

The training on Amyotrophic Lateral Sclerosis (ALS) in AVASUS (SUS Virtual Learning Environment) is structured as a training path with multiple educational modules, developed in partnership with the Laboratory of Technological Innovation in Health (LAIS/UFRN). The focus is on empowering health professionals, caregivers, and the general public to manage, assist, and understand ALS, a progressive neurodegenerative disease that destroys motor neurons, which are responsible for voluntary movements.

AVAMEC (4) was created on the initiative of the Ministry of Education (MEC) to support initial and continuing training programs for teachers and managers of basic education in Brazil (9,24,25). It aims to strengthen teacher training and democratize access to quality educational content, aligned with the guidelines of the National Common Curriculum Base (BNCC). It offers free online courses in various areas, mainly focused on education, such as School Management, Special Education, and Educational Technology, and covers other topics such as Health, Mathematics, Portuguese, Biology, and even training for the job market, such as Food Production and Tourist Itineraries. The system categorizes courses into areas such as Improvement, Training, Lato Sensu Specialization, Extension, and Continuing Education, and seeks to foster innovative pedagogical practices and integrate existing educational initiatives.

## Structure and Interface

Regarding the structure and interface of both, the virtual environments were designed to offer intuitive navigation and accessibility.

AVASUS (3) features a simple and functional interface, focusing on student autonomy. The platform organizes its courses by subject areas and uses a responsive design, allowing access from mobile devices and desktops. The structure of AVASUS prioritizes clarity in the presentation of content, with multimedia resources (videos, audios, e-books) integrated into the environment, promoting autonomous and collaborative learning.

AVAMEC (4) adopts an interface with visual resources that reflect its link to the MEC. The organization of courses occurs by categories, allowing the user to filter the training by target audience, such as teachers, managers or students. The AVAMEC interface incorporates interactive and gamified elements, such as automatic certificates, quizzes and discussion forums, which aim to engage participants and foster the exchange of experiences.

Given the above, we can look at more details by observing each criterion in Chart 1:

**Chart 1.** Analytical Comparison: AVASUS vs. AVAMEC

| Analysis Criteria | AVASUS | AVAMEC |
|---|---|---|
| Accessibility | Compatible with mobile devices, but lacks robust features for people with disabilities. | Good accessibility practices, including materials in different formats. |
| Certification and Validity | Issuance of free certificates with digital validation code, recognized as qualification, extension, and postgraduate lato sensu courses. | Issuance of free, recognized certificates for career advancement. Offers the possibility of converting courses into lato sensu postgraduate degrees. |
| Strategic Differentiation | Agility and responsiveness to public health crises (e.g., COVID-19, Zika), functioning as | Integration with the formal education system, allowing the attainment of a |

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|---|---|---|
| | a health management and international cooperation tool. | specialist title. Functions as a tool for implementing educational policies. |
| Thematic Focus | Exclusively health topics, defined by the needs of the SUS (Brazilian Unified Health System), including clinical areas, public health, management, and emergency response. | Main focus on teacher training, covering BNCC (National Common Core Curriculum), school management, educational technologies, literacy, and cross-cutting themes. |
| Functionalities | Accessible content with interactive tools. | Includes tools for interactivity and personalization of learning. |
| Governance | Ministry of Health (MS) in partnership with LAIS and SEDIS, from the Federal University of Rio Grande do Norte (UFRN). | Ministry of Education (MEC) in partnership with LabTime, from the Federal University of Goiás (UFG). |
| Impact and Reach | More than 1 million students and 2 million enrollments. International reach (e.g., Tanzania), demonstrating Brazilian soft power in health. | More than 1 million users. Massive national reach, with courses exceeding 200,000 enrollments, guaranteeing the capillarity of MEC policies. |
| Institutional Mandate | To qualify training, management, and assistance in the SUS (Brazilian Public Health System), serving as a tool for inducing the Permanent Health Education Policy. | To serve as a collaborative virtual environment to support the teaching-learning process and the continuing education of education professionals. |
| Evaluation Model | Continuous evaluation through self-assessment activities with automated feedback, pre/post-tests, and performance evaluation in simulations. | Based on the completion of the proposed activities, with some courses requiring a minimum grade for approval. |
| Pedagogical Model | Predominantly self-instructional, enriched with active methodologies, interactive clinical cases, and simulations to develop clinical reasoning. | Diverse, using a spiral curriculum, case studies, and methodologies focused on reflection on teaching practice and educational policies. |
| User Perception | Positive perception, especially for its role in emergencies. There is an active search for usability improvements. No formal evaluation on the gov.br portal. | Excellent platform evaluation on the gov.br portal. Negative perception of the mobile application, indicating a failure in the multichannel strategy. |
| Platform and Technology | Web platform focused on continuous improvement of the user experience (UX). There is no evidence of a dedicated mobile application. | Intuitive web platform. It has a mobile application, but with functionality problems. |
| Target Audience | Primary: Professionals, workers, and managers of the SUS. Secondary: Students in the health field and the general public. | Primary: Teachers, managers, and other education professionals from public and private networks. Secondary: Anyone interested. |
| Learning Resources | Intensive use of interactive resources: videos, animations, infographics, simulated games, calculators, and clinical scales. | Collaborative platform with diverse multimedia resources: texts, graphics, images, and videos. It has accessibility via VLibras. |
| Usability | Intuitive interface, but with a simple design. | More modern interface, with better visualization on mobile devices. |

**Source:** Data from research compiled by the Author (2025)

Although both environments are accessible and responsive, the difference in target audience and training purposes is reflected in the design and functionality choices. While AVASUS values simplicity and practical applicability of content, AVAMEC explores interactive resources to meet the diversity of educational demands.

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## Resources and Tools Available in the Environments

The analysis of the resources and tools available in the AVASUS (3) and AVAMEC (4) Virtual Learning Environments showed that both were developed to meet the specificities of their institutional objectives and the training demands of their respective audiences.

It was observed that, in AVASUS (3), the resources are oriented towards technical and continuing health training (11,12,27), promoting autonomous learning and the dissemination of knowledge on a large scale. The platform offers a variety of educational resources, encompassing multimedia content comprised of educational videos, interactive texts, infographics, and comics (visual narratives that combine text and images in sequence to tell a story), which promote the understanding of concepts and the practical application of knowledge.

Furthermore, it offers free certification for its courses, recognized by the Open University of the SUS (UNA-SUS), valuing the professional qualification and continuous updating of workers in the Unified Health System. Another relevant aspect is the commitment to accessibility, expressed in the adaptation of content for different user profiles, with options for audio description, subtitles, and inclusive language. Additionally, AVASUS maintains a bank of educational resources that offers support materials and independent study, expanding the possibilities for thematic deepening (8,26).

In the case of AVAMEC (4), the resources and tools were designed with a focus on teacher training (25) and pedagogical innovation, presenting functionalities aimed at integrating assessment, collaboration, and curricular alignment. For (6,9,10) the platform has assessment instruments, such as interactive quizzes, case studies, and simulations, which allow for continuous verification of participants' performance. It also incorporates gamification elements, stimulating engagement through progression in levels, scoring, and certification integrated into the educational system.

Furthermore, it offers collaborative resources, such as forums and discussion groups, that foster dialogue, the exchange of experiences, and the collective construction of knowledge. Another distinguishing feature is its integration with the National Common Curriculum Base (BNCC), ensuring that the content is aligned with the guidelines and competencies foreseen in Brazilian educational policies (29,30)

Given the data above, we can observe that AVASUS (3) emphasizes the dissemination of specific and practical knowledge for the health sector, while AVAMEC (4) invests in pedagogical methodologies that promote reflection and innovation in teaching.

## Comparative analysis between the Environments

When conducting a comparative analysis between AVASUS (3) and AVAMEC (4), we see that both environments are essential tools for training and education in health and education, respectively. Although they share the goal of promoting broad and free access to training, their structural and resource differences reflect the nature of the contexts in which they were developed.

Furthermore, both platforms face challenges, such as ensuring accessibility and keeping the offered content up-to-date. However, it is possible to prove that their impact on strengthening public education and health policies is undeniable, reaffirming their role as instruments of social and professional transformation, as we can observe in the comparison presented in Chart 2:

**Chart 2:** Comparative Analysis of AVASUS and AVAMEC data

| General Numbers | AVASUS | AVAMEC |
|---|---|---|
| Total registered users: | 1,410,226 | 2,793,698 |
| Registrations completed: | 3,997,326 | 8,258,410 |
| Certification eligibility: | 2,588,068 | — (not informed) |
| Active courses: | 490 | 527 |
| Inactive courses: | 9 | — (not informed) |
| Average investment per course: | R$ 51,838.93 | — (not informed) |
| Average investment per student: | R$ 6.35 | — (not informed) |
| Courses offered | — (not informed) | 5,013 |
| Content available | — (not informed) | 1,243 |
| Partner institutions | — (not informed) | 55 |

**Source:** Data from the official AVASUS website x Official AVAMEC website (September 3, 2025)

The comparative analysis between the indicators of AVASUS (3) and AVAMEC (4) was carried out on September 3, 2025 and reveals both convergences and significant differences in the reach and focus of each platform.

In quantitative terms, AVAMEC has a higher absolute number of registered users (2,793,698) and course participants (8,258,410), exceeding the values observed in AVASUS, which registers 1,410,226 users and 3,997,326 registrations. These numbers suggest that AVAMEC has a broader reach in terms of adherence and use, which can be explained by its generalist vocation aimed at training education professionals and the diversity of audiences served nationwide.

On the other hand, AVASUS demonstrates greater detail in results management, such as the registration of 2,588,068 users entitled to certification, an indicator not evidenced in AVAMEC. Furthermore, it presents average investment metrics per course (R$ 51,838.93) and per student (R$ 6.35), demonstrating concern for financial transparency and cost-benefit analysis of its actions. These elements indicate a focus on measuring educational impact associated with the efficiency of the resources applied, which is consistent with its specific purpose of qualification in the health field. The analysis of the indicators revealed that AVASUS demonstrates good cost-benefit per course and per certified student, possibly due to its leaner and more specialized structure.

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With regard to academic offerings, both platforms have similar numbers of active courses - 490 on AVASUS and 527 on AVAMEC. However, AVAMEC also explicitly states the existence of 5,013 classes and 1,243 contents, in addition to partnerships with 55 institutions, which shows an organization focused on the diversity of institutional actors and the segmentation of training. AVASUS, in turn, indicates the existence of 9 inactive courses (which have closed enrollment), signaling a concern about the life cycle of the training offered.

While AVAMEC (4) stands out for its volume of users, partner institutions, and diversity of courses, AVASUS differentiates itself by the depth of its educational and financial performance indicators, reflecting its emphasis on public health policies. The joint analysis suggests that both platforms fulfill complementary roles in the Brazilian educational ecosystem: AVASUS (3) as a specialized instrument for training in public health, and AVAMEC as an integrating environment for continuing education and support for the policies of the Ministry of Education.

In summary, both AVASUS (3) and AVAMEC (4) present a set of pedagogical and technological resources that, although distinct in focus and target audience, prove to be complementary in the purpose of promoting the quality, interactivity, and democratization of education mediated by digital technologies, and play a crucial role in the democratization of continuing education and in improving the quality of services offered in their respective areas of activity.

## FINAL CONSIDERATIONS

This research shows that both AVASUS and AVAMEC are models of excellence in technology-mediated education, representing consolidated public policies in the areas of health and education, allowing for a broad and critical understanding of the potential and limitations of two of the main public initiatives for technology-mediated education in Brazil. The results show that both platforms play a relevant role in democratizing access to knowledge, expanding training opportunities and promoting professional qualification in different areas of knowledge.

The study demonstrated that AVASUS, aimed at training in the health field, stands out for its pedagogical effectiveness, the clarity of its training objectives, and its coherence with the policies of Continuing Education in Health. Its modular structure, combined with a simple and functional interface, favors autonomous learning and the engagement of professionals linked to the Unified Health System (SUS). AVAMEC, managed by the Ministry of Education, stands out for its thematic diversity and broad reach, constituting a platform with a significant social impact on teacher training and professional development for educators.

The differences observed between the platforms reflect not only the specificities of their managing bodies, but also their distinct pedagogical and technological design strategies. While AVASUS prioritizes the immediate applicability of technical knowledge, AVAMEC offers diverse training paths, focusing on the collaborative and continuous construction of knowledge. Both, however, converge on the purpose of making public knowledge accessible, inclusive, and of high quality, contributing to the consolidation of a national digital education policy.

The research also highlighted challenges that persist in improving the analyzed environments, especially regarding full accessibility, optimization of the mobile experience, and the integration of data and functionalities between ministerial platforms. These aspects demand continuous investments in technological innovation, inclusive design, and

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intersectoral policies capable of ensuring digital equity and the sustainability of government initiatives in distance education.

As a practical contribution, this study offers support for public managers, developers, and researchers interested in evaluating and improving virtual educational environments. It is recommended that future research conduct empirical studies with real users, involving mixed methodologies (questionnaires, interviews, and log analysis), in order to deepen the understanding of the learning experience, usability, and pedagogical impact of government VLEs.

Finally, AVASUS and AVAMEC represent complementary and successful examples of technology-mediated education, demonstrating that the integration between digital innovation, accessibility, and pedagogical intentionality is an essential condition for strengthening public education in the 21st century. By promoting learner empowerment and the democratization of knowledge, these platforms reaffirm the strategic role of digital technologies in building a more inclusive, critical, and participatory society.

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