Rev Rene. 2026;27:e96464.
DOI: 10.36517/2175-6783.20262796464
www.periodicos.ufc.br/rene

Original Article

Health-Promoting School and teacher's work: development and validation of a professional training technology

Escolas Promotoras de Saúde e o trabalho docente: desenvolvimento e validação de uma tecnologia de capacitação profissional

How to cite this article:
Silva ML, Carvalho AKCL, Castro EF, Pereira LS, Maciel DS, Pinheiro PNC, et al. Health-Promoting School and teacher's work: development and validation of a professional training technology. Rev Rene. 2026;27:e96464. DOI: https://doi.org/10.36517/2175-6783.20262796464

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Conflict of interest: the authors have declared that there is no conflict of interest.

ABSTRACT

Objective: to develop and validate the content and appearance of a self-learning course grounded in the Health-Promoting Schools approach. **Methods:** a methodological study based on Instructional Design, developed in three stages—analysis and planning, content development, and validity—by 40 judges using specific predefined instruments (*Instrumento de Validação de Conteúdo Educacional em Saúde* and *Instrumento de Validação de Aparência de Tecnologia Educacional em Saúde*). **Results:** the course was structured into four modules based on World Health Organization guidelines and Brazilian curricula. Validity showed high agreement, with Content Validity Indices>0.80 and Appearance Validity Indices>0.78. Validity ratios were also satisfactory. **Conclusion:** the course created demonstrates strong evidence of validity, serving as a reliable educational technology to develop teachers' skills in school health promotion. **Contributions to practice:** this training technology may support schoolteachers to strengthen their competencies on health promotion into curricular and extracurricular activities, enhancing the potential of Health-Promoting Schools.
Descriptors: Health Education; Teaching; Educational Technology; Validation Study.

RESUMO

Objetivo: desenvolver e validar o conteúdo e aparência de um curso autoinstrucional fundamentado na abordagem das Escolas Promotoras de Saúde. **Métodos:** estudo metodológico baseado em *Design* Instrucional, desenvolvido em três etapas — análise e planejamento, desenvolvimento do conteúdo e validação — por 40 juízes utilizando instrumentos específicos previamente definidos (Instrumento de Validação de Conteúdo Educacional em Saúde e Instrumento de Validação de Aparência de Tecnologia Educacional em Saúde). **Resultados:** o curso foi estruturado em quatro módulos com base nas diretrizes da Organização Mundial da Saúde e nos currículos brasileiros. A validação demonstrou elevada concordância, com Índices de Validade de Conteúdo>0,80 e Índices de Validade de Aparência>0,78. As razões de validade também foram satisfatórias. **Conclusão:** o curso desenvolvido apresenta fortes evidências de validade, sendo uma tecnologia educacional confiável para desenvolver competências docentes na promoção da saúde na escola. **Contribuições para a prática:** esta tecnologia de capacitação pode apoiar professores da educação básica no fortalecimento de suas competências em promoção da saúde em atividades curriculares e extracurriculares, ampliando o potencial das Escolas Promotoras de Saúde.
Descritores: Educação em Saúde; Ensino; Tecnologia Educacional; Estudo de Validação.

Received: Feb. 25th 2026; Accepted: May 20th 2026.

Introduction

School is one of the main contexts in policies, programs, and actions to promote health and comprehensive development of school-age children and adolescents[1-2]. In 2021, the World Health Organization (WHO) reinforced a global call for all schools to meet the Health Promoting School (HPS) approach standards and guidelines, based on evidence of a whole-school approach that allows for enhancing health behaviors, quality of life, and learning[1-3].

The HPS approach, established by WHO in the 1990s, aims to integrate health into school culture, policies, environment, curriculum, and community partnerships. Rather than focusing only on disease prevention or isolated campaigns, HPS targets students, teachers, families, managers, and the broader school community, seeking to improve health, well-being, equity, and learning outcomes[1-2].

Intersectoral actions involving the school context are fundamental in Brazilian health policies[4]. In Brazil, the School Health Program (SHP) can be understood as the main intersectoral policy mechanism for operationalizing principles that converge with the WHO-HPS approach. While HPS offers a broader conceptual and strategic framework for integrating health and education, SHP provides institutional arrangements, actions, and management pathways that support this implementation in public schools. After almost 20 years since the creation of SHP, more than 90% of Brazilian municipalities have joined the program in recent cycles[5]. In this context, the role of nursing is fundamental in coordinating essential efforts between the health and education sectors to enable health promotion actions in schools.

Evidence indicates that SHP implementation may favor healthier behaviors, improved school climate, stronger intersectoral collaboration, and greater alignment between health and pedagogical actions. However, its implementation also faces recurring challenges, such as limited teacher training, fragmented intersectoral coordination, work overload, discontinuity of actions, and insufficient family or community engagement[6-7].

Training courses are an important strategy for strengthening the school community's capacity to promote health in schools. Studies indicate that self-paced courses can effectively support educators, such as those in Canada and Israel, in expanding school-based actions on mental health and health promotion. However, these interventions were developed outside Brazil and often lack content and visual validity aligned with the Brazilian context, limiting their applicability[8-9]. In Brazil, available evidence addresses technical training for healthcare professionals or focuses on specific topics, such as healthy eating. Overall, most training initiatives do not adopt a comprehensive HPS/SHP framework and rigorously developed and validated self-instructional technologies for basic education teachers remain scarce, underscoring the need for culturally grounded and methodologically sound educational tools to strengthen teachers' competencies[10-11].

This study assumes that validated educational technology can help bridge teachers' knowledge gaps by providing a standardized tool aligned with public health policies. Therefore, strengthening teaching practices across different subject areas within basic education, particularly in relation to school health promotion, is essential. Moreover, a course designed to facilitate learning and rigorously assessed by experts in school health promotion, as well as by basic education teachers, may enhance its adaptability to diverse school contexts, thereby increasing its potential for impact and replication[12].

Therefore, the present study aimed to develop and validate the content and appearance of a self-learning course grounded in the Health-Promoting Schools approach.

Methods

Study design and period

This methodological study was conducted be-

tween January and December 2024 by a team of 11 researchers affiliated with a Graduate Program in Public Health in Fortaleza, Brazil. The stages followed Instructional Design guidelines: 1) educational technology analysis and planning; 2) educational technology elaboration; and 3) educational technology validation.

Instructional Design was adopted as the methodological framework due to its support for the systematic planning, sequencing, development, and validity of educational technologies[13]. Its use aligns with the HPS/SHP perspective, as both emphasize intentional planning, contextual adaptation, active learning, and the integration of content with practice in real-world settings.

Stage 1 – Educational technology analysis and planning

The first stage was based on a documentary analysis to build the educational technology's theoretical framework. The searching strategy included websites containing international guiding documents on WHO-HPS from organizations such as the WHO and the Pan American Health Organization[1-2]. Subsequently, legal, and programmatic frameworks from the Brazilian context were searched and analyzed, including the Law of Directives and Bases for National Education[14] and materials from SHP.

Finally, a targeted bibliographic search was conducted using Google Scholar, selected for its broad coverage of academic and gray literature, including experience reports relevant to teacher training gaps. The search employed terms such as "school health promotion," "teacher training," and "educational technology," with no time restrictions. It was initiated in February 2024 and last updated in November 2024. After that, the identified documents were considered in the development of the design, content, and evidence-based pedagogical strategies mentioned in the training course.

Stage 2 – Educational technology elaboration

The course was developed using a self-instructional format, with clear objectives at the beginning of each module and guidance for further study, encouraging participants' self-reflection. The course was organized systematically and sequentially, ensuring coherent progression from basic to advanced. In addition to the text, multimedia educational resources such as illustrations, infographics, and short videos were included to accommodate different learning styles and make the content more dynamic.

The course was structured into four modules, the content of which was organized on the Canva platform, enabling collective layout and inclusion of graphic elements, with the aim of facilitating understanding of the material[11,15]. This platform was chosen to optimize collaborative design, and the final material was generated in a universal format (PDF) to ensure accessibility and dissemination of the final technology in digital and printed formats.

Prior to the validity process, the course prototype underwent internal reviews to correct any errors and make necessary adjustments, ensuring that the version presented to the judges was technically stable and pedagogically consistent. During this period, six researchers affiliated with a Graduate Program in Public Health reviewed the educational technology through 27 online meetings held between September and November 2024. These meetings involved collective reading of each unit, identification of conceptual, grammatical, pedagogical, and visual issues, as well as consensus-based adjustments. Each meeting lasted an average of 89 minutes, totaling approximately 40 hours of work to fully review all proposed course units.

The course was designed for an estimated total workload of 60 hours, distributed across four modules, including reading, interaction with multimedia resources, and reflective activities proposed throughout the material.

Stage 3 – Educational technology validation

The validation stage was conducted by experts and teachers, who assessed the course content and appearance. This approach was adopted because it emphasizes the development of educational technologies tailored to the target audience's needs by integrating the researcher's judgment, an expert on the topic, with that of the educational technology's target audience. Moreover, it followed recommendations for using specific instruments with their respective rigorous criteria[16].

To this end, between December 2024 and January 2025, research judges and basic education teachers were invited to assess the educational technology produced. Although the course focuses on elementary school, the inclusion of teachers from distinct levels of basic education in the panel of judges was intentional, aiming to gather diverse perspectives on the applicability and relevance of the topics covered.

A purposive sample was used, and no formal sample size calculation was performed, as this was a methodological validity study based on expert judgment. They were invited through the "snowball" technique or by accessing information on scientific or professional research networks, as in others methodological studies[11,17]. Participant characterization included region of residence, sex, age group, academic qualification, employment status at school, professional category, and teaching experience.

The selection of research judges followed criteria adapted from the literature, based on parameters involving academic qualifications (doctoral and/or master's degree), minimum practical experience of at least three years in the area, and evidence of scientific production (publication of articles, dissertations or theses related to the topic).

For teacher judges, a minimum of one year of experience in public education and working in public schools was considered. All judges who did not complete all required assessment stages were excluded.

The material was initially made available to all judges through a link to an instructional video explaining key research information and the Informed Consent Form. After agreeing to participate in the study, they accessed educational technology in PDF format, along with the validity of the instruments, through the SurveyMonkey® platform. The instrument included questions to characterize participants and open-ended questions to collect suggestions and textual feedback regarding educational technology.

Assessment was conducted by modules 1 to 3 (M1, M2, and M3). However, in the five units in module 4 (M4U1, M4U2, M4U3, M4U4, and M4U5), all judges assessed the first unit and were then free to assess the unit corresponding to their training or experience.

The validation process was based on evidence of content and appearance validity, assessed through previously validated instruments specific to educational technologies in health (*Instrumento de Validação de Conteúdo Educacional em Saúde* [IVCES] and *Instrumento de Validação de Aparência de Tecnologia Educacional em Saúde* [IVATES])[18-19], in combination with agreement-based indices (Content Validity Index [CVI]/Face Validity Index [FVI]) and essentiality analysis through the Content Validity Ratio (CVR).

The IVCES is an instrument that allows assessment using a Likert-type scale ranging from 0 (strongly disagree) to 2 (strongly agree)[18]. The IVATES consists of 12 items that assess the visual aspects, formatting, and usability of the course, using a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree)[19].

To calculate the CVI, the number of experts who judged an item as relevant/appropriate (score of two on the scale) was divided by the total number of experts. The ideal minimum CVI value for each item is 0.8, meaning that at least 80% of experts must fully agree for an item to be considered valid without adjustments. Items whose CVI fell below this threshold were revised or excluded as appropriate. It should be noted that the possibility of choosing one or more

units to assess among the four units of module 4 (M4U2, M4U3, M4U4, and M4U5) resulted in different numbers of judges assessing each unit.

The FVI calculation considered judges' percentage agreement regarding each appearance criterion. Values with a FVI ≥ 0.80 indicate that the material is appropriate and attractive. Items or aspects with a lower FVI were reassessed and adjusted in the course content or design.

Additionally, the CVR formula was applied, calculated based on the number of judges who considered an item essential, whose coefficient varies from -1 to +1, with higher positive values indicating greater consensus on the essentiality of an item. It presents a minimum recommended critical value of the CVR for each element assessed, adjusted according to the number of judges[20].

Quantitative data from IVCES and IVATES assessments were compiled and subjected to descriptive statistical analysis. If the process presented items for which the minimum index was not met, a new-validation round was performed.

Four team members, in four online meetings in February 2025, analyzed and incorporated judges' suggestions into the definitive version of the educational technology, aiming for pedagogical and visual adaptation for basic education teacher training.

All relevant recommendations were discussed and incorporated into the definitive version of the educational technology. The main modifications included: (i) updating theoretical and normative references, with partial inclusion of suggested curricular guidelines; (ii) revising and standardizing content to correct inconsistencies and improve conceptual clarity; (iii) enhancing visual elements, including modification, removal, and adaptation of illustrations to reduce repetition and strengthen their pedagogical purpose; (iv) adding reflective questions at the end of units to foster critical thinking; and (v) reviewing links and adjusting content to improve accessibility and coherence.

Ethical aspects

All participants were informed about the study's objectives and procedures and signed the Informed Consent Form, in accordance with Resolution No. 466/2012 of the National Health Council. The study was approved by the Research Ethics Committee of the State University of Ceará under Opinion No. 6.844.517/2024 and Certificate of Submission for Ethical Review No. 77285324.8.0000.5534.

Google Docs' artificial intelligence tools were used exclusively for grammatical correction and linguistic refinement; the authors remain fully responsible for the content of the manuscript.

Results

Module 1, with 27 references, addressed intersectoral policies and guidelines in health and education, concepts, guiding documents and legal frameworks, with emphasis on the Ottawa Charter and the Law of Guidelines and Bases of National Education.

Module 2, with 11 references, focused on health promotion in school settings, presenting guidelines and strategies for integrating health into teaching work, considering WHO Global Standards and SHP.

Module 3, supported by 21 references, explored ways of integrating health into the school curriculum, with an emphasis on pedagogical planning and teaching practice, based on documents such as the Brazilian National Common Curricular Base and the Brazilian National Curricular Guidelines for Basic Education.

The final module, "Pedagogical Experiences of Integrating Health into the School Curriculum," presents a total of 97 references, distributed across five units, incorporating case studies, reports of best practices, and guidelines for implementing school projects focused on health promotion. Furthermore, a specific unit has been included in module 4, designed to justify the importance of valuing teaching experiences in this area.

For the educational technology validation, more than 100 judges were invited. However, 79 judges accessed the assessment form and began filling it out. Of these, 40 completed all sections of the instruments for the four modules and were considered in the final sample. Of these, seven met the criteria for researcher judges and 33 for basic education teacher judges. Table 1 presents participant characteristics.

Table 1 – Judge characterization. Fortaleza, CE, Brazil, 2024

Variables	n (%)
Groups of judges	
Basic education teacher	33 (82.5)
Researcher/school health expert	7 (17.5)
Region of the country where they live	
North	1 (2.5)
Northeast	35 (87.5)
Central-West	0 (0.0)
Southeast	0 (0.0)
South	4 (10.0)
Gender	
Female	21 (52.5)
Male	19 (47.5)
Age range (years)	
18 to 24	0 (0.0)
25 to 34	10 (25.0)
35 to 44	15 (37.5)
45 to 54	11 (27.5)
55 to 64	4 (10.0)
>65	0 (0,0)
Academic qualification (highest level)	
Postdoctoral degree	1 (2.5)
Doctoral degree	7 (17.5)
Master's degree	10 (25.0)
Graduate (*lato sensu*/specialization) degree	16 (40)
Higher education	6 (15.0)
Affiliation with school	
Permanent	32 (80.0)
Temporary	8 (20.0)

The results presented in the tables are organized according to the course's structural acronyms, where M represents the core modules and U refers to their respective units. This nomenclature follows the pedagogical organization of technology, starting from: M1 - Intersectoral policies and guidelines in health and education; M2 – Health-Promoting Schools: guidelines and pathways for teaching work; and M3 - Teaching work and health in the school curriculum. The specific applications are detailed in: M4U1 - Teacher training and experiences with health in the school curriculum topics; M4U2 - Languages and codes; M4U3 - Natural sciences and mathematics; M4U4 - Human sciences and religious education; and M4U5 - Electives and diversified curriculum proposals. This standardization ensures a direct correspondence between the educational content and the validity indices achieved in each section.

Concerning content validity, all items achieved CVI values equal to or greater than 0.80, indicating a high degree of agreement among judges on the relevance and adequacy of the content.

Several CVR values were above 0.65, the threshold that considers each item, ensuring the maintenance of essential elements in the course content. Only two items in M1 (Encourages behavior change; and Appropriate text size) scored 0.60, which is still above the critical values for the 40 judges. In M4U5, one item (Clarifies doubts about the topic discussed) was assessed by 25 judges and received a score of 0.60, higher than the critical value (0.44). Therefore, there was no need for review by judges or exclusion of the content (Table 2).

Regarding appearance, FVI and CVR values were high across all modules, indicating that most items were considered appropriate and attractive by judges, with a FVI ≥ 0.80, as recommended. Only one item (Appropriate to the teaching-learning process) from M4U2 presented a CVR of 0.88, which is considered essential. Therefore, there was no need for the judges to reassess the course appearance (Table 3).

Table 2 – Content assessment using the *Instrumento de Validação de Conteúdo Educativo em Saúde*. Fortaleza, CE, Brazil, 2024

Item/IVCES	M1 (40 judges)		M2 (40 judges)		M3 (40 judges)		M4U1 (40 judges)		M4U2 (17 judges)		M4U3 (14 judges)		M4U4 (8 judges)		M4U5 (25 judges)	
	CVI	CVR	CVI	CVR	CVI	CVR	CVI	CVR	CVI	CVR	CVI	CVR	CVI	CVR	CVI	CVR
Content																
1	0.90	0.80	0.98	0.95	0.93	0.85	0.95	0.90	0.94	0.88	0.86	0.71	0.88	0.75	0.92	0.84
2	0.90	0.80	0.93	0.85	0.95	0.90	0.93	0.85	0.82	0.65	0.93	0.86	0.88	0.75	0.88	0.76
3	0.90	0.80	0.90	0.80	0.90	0.80	0.95	0.90	0.82	0.65	0.86	0.71	0.88	0.75	0.80	0.60*
4	0.95	0.90	0.95	0.90	0.98	0.95	0.93	0.85	0.94	0.88	0.93	0.86	1.00	1.00	0.84	0.68
5	0.80	0.60*	0.85	0.70	0.85	0.70	0.88	0.75	0.94	0.88	0.93	0.86	0.88	0.75	0.92	0.84
Structure																
6	0.90	0.80	0.95	0.90	0.88	0.75	0.90	0.80	0.88	0.76	0.86	0.71	1.00	1.00	0.84	0.68
7	0.88	0.75	0.93	0.85	0.90	0.80	0.93	0.85	0.88	0.76	1.00	1.00	1.00	1.00	0.88	0.76
8	0.88	0.75	0.93	0.85	0.90	0.80	0.90	0.80	0.88	0.76	0.93	0.86	1.00	1.00	0.88	0.76
9	0.95	0.90	0.95	0.90	0.90	0.80	0.93	0.85	0.94	0.88	0.93	0.86	1.00	1.00	0.88	0.76
10	0.85	0.70	0.88	0.75	0.83	0.65	0.93	0.85	0.88	0.76	0.93	0.86	1.00	1.00	0.92	0.84
11	0.93	0.85	0.93	0.85	0.90	0.80	0.93	0.85	0.88	0.76	0.86	0.71	1.00	1.00	0.88	0.76
12	0.88	0.75	0.98	0.95	0.93	0.85	0.95	0.90	0.94	0.88	0.93	0.86	1.00	1.00	0.88	0.76
13	0.95	0.90	0.95	0.90	0.95	0.90	0.98	0.95	0.94	0.88	0.93	0.86	1.00	1.00	0.84	0.68
14	0.95	0.90	0.98	0.95	0.95	0.90	0.95	0.90	0.88	0.76	1.00	1.00	1.00	1.00	0.88	0.76
15	0.80	0.60*	0.93	0.85	0.88	0.75	0.93	0.85	0.94	0.88	1.00	1.00	1.00	1.00	0.84	0.68
Relevance																
16	0.90	0.80	0.88	0.75	0.90	0.80	0.95	0.90	0.88	0.76	0.93	0.86	1.00	1.00	0.88	0.76
17	0.95	0.90	1.00	1.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.76
18	0.90	0.80	0.95	0.90	0.93	0.85	0.90	0.80	0.76	0.53	1.00	1.00	1.00	1.00	0.88	0.76

*Above the critical limit (Lawshe's significance), but below the 0.80 threshold for an essential item, according to the specific number of judges who assessed the module/unit; IVCES: *Instrumento de Validação de Conteúdo Educacional em Saúde*; M: Module; U: Unit; CVI: Content Validity Index; CVR: Content Validity Ratio

Table 3 – Educational technology appearance assessment. Fortaleza, CE, Brazil, 2024

Item/IVCES	M1 (40 judges)		M2 (40 judges)		M3 (40 judges)		M4U1 (40 judges)		M4U2 (17 judges)		M4U3 (14 judges)		M4U4 (Eight judges)		M4U5 (25 judges)	
	FVI	CVR	FVI	CVR	FVI	CVR	FVI	CVR	FVI	CVR	FVI	CVR	FVI	CVR	FVI	CVR
1	0.95	0.90	0.98	0.95	1.00	1.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.98	0.95	0.98	0.95	1.00	1.00	0.98	0.95	0.94	0.88	1.00	1.00	1.00	1.00	1.00	1.00
3	0.98	0.95	1.00	1.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	0.95	0.90	1.00	1.00	0.98	0.95	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	0.95	0.90	1.00	1.00	1.00	1.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	0.95	0.90	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	0.98	0.95	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	0.95	0.90	1.00	1.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
11	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.95	0.90	1.00	1.00	1.00	1.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

IVCES: *Instrumento de Validação de Conteúdo Educacional em Saúde*; M: module; U: unit; FVI: Face Validity Index (Appearance); CVR: Content Validity Ratio

The judges positively assessed several aspects of the course, highlighting its clarity and objectivity, accessible language that facilitates understanding for different audiences, and its logical organization and structure, divided into modules and units that allow for a progressive and focused approach. The practical nature of the course stood out, especially in module 4, with pedagogical experiences and concrete examples for teachers to apply in the classroom.

Discussion

The course showed content and appearance validity indices above the recommended thresholds, indicating adequate agreement among judges regarding relevance, clarity, structure, and visual presentation[18-20]. The participation of both researcher judges and basic education teachers strengthened the validity process by combining scientific expertise with practical knowledge from the school routine. This composition is particularly relevant in educational technologies aimed at teachers, since it helps ensure not only conceptual consistency but also contextual applicability, language adequacy, and feasibility of use in real school settings.

A study that supports these results assessed a teacher training program in Canada and observed a significant increase in knowledge about mental health, in addition to a reduction in stigma associated with mental disorders among educators[8]. A similar study on teacher training in health promotion demonstrated direct contributions to positive changes in students' habits[9]. In Brazil, teacher training programs in mental health highlighted that structured and validated training increases teachers' confidence in applying the suggested strategies[21]. These findings demonstrate that validated courses are effective tools for strengthening health promotion in school settings, converging with the results of this study.

On the other hand, challenges in implementing self-instructional courses, such as excessive workload and lack of synchronous support, which can compromise teacher engagement, reducing course completion rates[22]. Another point to consider is the level of maturity of teachers and their motivation, which can affect the learning process. This requires more guided attention for novice teachers, as more experienced teachers can benefit more from self-instructional courses due to greater autonomy. Although this model offers flexibility, moments of synchronous interaction increase knowledge retention and teacher commitment[23].

The training content needs to be adaptable, as the adaptation of health promotion actions to the specific school context stands out in the literature as an essential factor for its effectiveness[12]. Incorporating practical elements and adaptable examples improves teachers' ability to contextualize activities, making them more meaningful.

The judges' open-ended comments reinforced the practical examples in the content, which strengthened the potential adaptation of the strategies to diverse school realities. Thus, the final product presents itself as a coherent and integrated teaching tool, which can contribute to enhancing learning and encouraging the overcoming of challenges and perspectives inherent to school health promotion.

Recognizing that the reality in Brazilian public schools is marked by several social and educational inequalities, the course was designed with a dual adaptability strategy. First, its dissemination as an open-access e-book, which allows for online, offline, and printed use, aims to overcome connectivity barriers. Additionally, module 4 offers a comprehensive catalogue of practical experiences, which were mentioned in the course to encourage teachers to recognize feasible possibilities for their local realities. This combination of an accessible format with adaptable content strengthens the technology's potential to connect with the schools' concrete needs, as well as to integrate into policies such as SHP.

Considering that the literature has highlighted the need to direct health training courses towards teachers, programs that encourage active participation and networking among teachers are more effecti-

ve[24-25]. Adapting the course to teachers' pedagogical practices is an innovative feature of this study, favoring the sustainability of actions and the long-lasting impact on students' health.

In online teacher training more broadly, a systematic review of online professional development for teachers identifies key design elements associated with improved outcomes, including clear learning objectives, practice-relevant activities, coherent course organization, support for learner engagement, and instructional strategies that promote active learning and knowledge application. This evidence is directly transferable to self-instructional courses, as it underscores that flexibility alone is insufficient and must be accompanied by pedagogical intentionality and coherent assessment[26].

Beyond validity, longitudinal approaches that can assess the real impact on teachers' pedagogical practice are necessary to ensure that the knowledge acquired is effectively applied in the daily school routine, allowing us to understand how teachers implement new strategies and how this affects students over time.

In addition, promoting healthy behaviors in school settings remains a key strategy for improving population health. Recent global evidence has reconceptualized the role of physical activity in public health, emphasizing its multidimensional benefits, including immune, mental health, and cancer-related outcomes, and highlighting the need for policies and environments that expand equitable opportunities for healthy lifestyles[27].

Study limitations

First, during the development stage, the preliminary version of the course was not assessed as a piloting process with the target audience before the validity stage. However, the long-term development process and the involvement of several schoolteachers in the working group and validity stages may have partially mitigated this limitation. Second, the validity phase predominantly involved experts from the Northeast region, limiting the regional diversity of the sample, despite the use of multiple recruitment strategies to broaden participation.

Finally, the study focused on internal validity (content and face validity), limiting the inferences about its effectiveness in real-world contexts, such as changes in teachers' pedagogical practices and impacts on students' health outcomes. Future research should assess the course in real-world settings, including longitudinal assessments of implementation, changes in pedagogical practices, and impacts on student health outcomes.

Contributions to practice

This is one of the first self-instructional educational technologies designed and validated to support the integration between education and health within school settings. As recommended by the WHO-HPS framework, the role of teachers in implementing effective strategies to improve student well-being is strengthened by this study.

Teachers and school stakeholders may use this technology as a comprehensive resource for teacher training, grounded in structured, evidence-based content. Moreover, the material supports the identification of key health topics and strategies, as well as the reorganization of curricular and extracurricular activities related to school health promotion. The experiences presented in the course may also inform pedagogical planning and practice, while fostering collaboration between the education and health sectors. Furthermore, its modular design and inclusion of strategies applicable to everyday school contexts enhance its usability across diverse educational settings and disciplines.

To ensure broad dissemination and accessibility, the course is delivered through a learning management system, and an open-access e-book has been published as part of the *ProMOVE Escolas+Saudáveis* project (available at: https://promove-escolas-saudaveis.com.br/).

Conclusion

The self-paced course that was developed and validated was found to be appropriate in terms of content and design for training elementary and secondary school teachers in school health promotion, in line with the Health-Promoting Schools approach. The course was also considered an innovative educational strategy, with the potential to promote the dissemination of teaching practices aligned with the demands of the school context and to strengthen the role of teachers as agents of health promotion in the school environment.

Acknowledgments

This work was carried out with the support of the agreement established between the *Secretaria Municipal de Educação de Fortaleza* (SME), the *Universidade Federal do Ceará* (UFC), and the *Fundação Cearence de Pesquisa e Cultura* (FCPC), registered under No. 03/2022 at SME and No. 07/2022 at UFC.

Furthermore, funding was granted by the National Council for Scientific and Technological Development, process no. 312091/2021-4, and by the Ceará Foundation for Support of Scientific and Technological Development, process no. 31032.003393/2024-45.

Author's contributions

Study conception and design or data analysis and interpretation: **Silva ML, Pereira LS, Barbosa Filho VC**. Manuscript drafting or critical revision of the manuscript for important intellectual content: **Silva ML, Carvalho AKCL, Castro EF**. Final approval of the version to be published and agreement to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the manuscript are appropriately investigated and resolved: **Silva ML, Carvalho AKCL, Castro EF, Pereira LS, Maciel DS, Pinheiro PNC, Barbosa Filho VC**.

Data availability

The dataset supporting the results of this study, including the course structure and detailed qualitative assessment by expert and teacher judges, is publicly available in a Google Drive digital repository at the following URL: https://drive.google.com/drive/folders/18zgRJjANMdtW1I6QxkANMahX9_QBUcz0?usp=sharing.

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