revista de pesquisa ISSN 2175-5361

CUIDADO É FUNDAMENTAL

Escola de Enfermagem Alfredo Pinto – UNIRIO

ORIGINAL ARTICLE *DOI: 10.9789/2175-5361.rpcfo.v17.13611*

DEVELOPMENT AND VALIDATION OF A VIRTUAL LEARNING ENVIRONMENT FOR TRAINING NURSES ON SMOKING

Desenvolvimento e validação de ambiente virtual de aprendizagem para capacitação de enfermeiros sobre tabagismo

Desarrollo y validación de un entorno virtual de aprendizaje para la formación de enfermeras en tabaquismo

Ana Elisa de Oliveira Alho[1]
Thais Moreira São João[2]
Heloísa Garcia Claro[3]
Silvio Eder Dias da Silva[4]
Márcia Aparecida Ferreira de Oliveira[5]

RESUMO

Objetivo: desenvolver e avaliar um Ambiente Virtual de Ensino-Aprendizagem voltado para a capacitação de enfermeiros sobre cessação do tabagismo, avaliando o Índice de Validade de Conteúdo e as percepções dos enfermeiros. **Método:** o ambiente foi desenvolvido seguindo o modelo Análise, Desenho, Desenvolvimento, Implementação e Avaliação e validado por seis especialistas em saúde coletiva e tabagismo. Enfermeiros foram convidados a participar do curso online. A usabilidade foi avaliada por meio da Escala SUS, e calculado o índice de validade do conteúdo. **Resultados:** o índice de validade de conteúdo apresentou valores superiores a 0,80, indicando alta concordância entre os especialistas quanto à relevância e clareza do conteúdo. A Escala SUS resultou em uma média de 85 pontos, indicando boa usabilidade da plataforma. **Conclusão:** o

[1,3] Universidade Estadual de Campinas- UNICAMP, Campinas, São Paulo, Brasil.
[2] Universidade Rhode Island, Kingston, RI, Estados Unidos.
[4] Universidade Federal do Pará, Belém Pará, Brasil.
[5] Universidade de São Paulo, São Paulo, São Paulo, Brasil.

Received: 2024/10/28. **Accepted:** 2025/04/02

CORRESPONDING AUTHOR: Ana Elisa de Oliveira Alho
E-mail: a197763@dac.unicamp.br
How to cite this article: Alho AEO, São João TM, Claro HG, Silva SED, Oliveira MAF. Desenvolvimento e validação de ambiente virtual de aprendizagem para capacitação de enfermeiros sobre tabagismo. R Pesq Cuid Fundam. [Internet]. 2025 [cited year month day];17:e13611. Available from: https://doi.org/10.9789/2175-5361.rpcfo.v17.13611.

ambiente virtual mostrou-se eficaz na capacitação de enfermeiros, promovendo a educação permanente e aprimorando a atuação no manejo do tabagismo.

DESCRITORES: Educação continuada; Controle do tabagismo; Tecnologia educacional

ABSTRACT

Objective: to develop and evaluate a Virtual Teaching-Learning Environment for training nurses in smoking cessation, assessing the Content Validity Index and nurses' perceptions. **Method**: the environment was developed using the Analysis, Design, Development, Implementation, and Evaluation model and validated by six public health and smoking experts. Nurses were invited to participate in the online course. Usability was assessed with the SUS Scale, and the content validity index was calculated. **Results**: the content validity index showed values above 0.80, indicating high expert agreement on content relevance and clarity. The SUS Scale averaged 85 points, indicating good usability. **Conclusion**: the virtual environment effectively trained nurses, promoted continuing education, and enhanced performance in smoking management.

DESCRIPTORS: Continuing education, Tobacco control; Educational technology

RESUMEN

Objetivo: desarrollar y evaluar un Entorno Virtual de Enseñanza-Aprendizaje para la formación de enfermeras en deshabituación tabáquica, valorando el Índice de Validez de Contenido y sus percepciones. **Método**: el entorno se desarrolló siguiendo el modelo de Análisis, Diseño, Desarrollo, Implementación y Evaluación, y fue validado por seis especialistas en salud pública y tabaquismo. Enfermeras fueron invitadas a participar en el curso en línea. La usabilidad se evaluó con la escala SUS y se calculó el índice de validez del contenido. **Resultados**: el índice de validez mostró valores superiores a 0,80, indicando alto acuerdo sobre la relevancia y claridad del contenido. La escala SUS dio una media de 85 puntos, indicando buena usabilidad. **Conclusión**: el entorno virtual mostró eficacia en la formación de enfermeras, promoviendo la formación continuada y mejorando el rendimiento en el tratamiento del tabaquismo.

DESCRITORES: Educación continua, Control del tabaco, Tecnología educacional

INTRODUCTION

Smoking is a chronic disease that manifests itself through nicotine addiction and the inhalation of smoke from burning tobacco. It represents one of the biggest public health crises, with a devastating global impact. Every year, more than 8 million people lose their lives to tobacco, and around 1.2 million of these deaths are attributed to passive exposure to smoke. It is important to note that all forms of tobacco are harmful to health and there is no safe level of exposure.[1]

In Brazil, the Unified Health System (SUS) has played an essential role in formulating and implementing tobacco control policies, with a focus on health promotion, disease prevention and access to tobacco management treatments. Tobacco control initiatives in the SUS are based on the articulation between different levels of care, using an interdisciplinary and integrated approach that is in line with the Expanded Clinic and Interdisciplinary Care, fundamental principles for the care of people who wish to manage tobacco use.

The International Council of Nurses encourages nurses to raise government and public awareness about the harms of tobacco and to promote measures to reduce and eliminate tobacco use, including access to cessation programs. Nurses, who make up the largest share of health professionals globally, play a significant role in these initiatives, impacting the reduction of tobacco use. Studies show that nurses and their organizations are crucial in reducing tobacco-related diseases through research, policy, practice and education. Nursing plays a key role in promoting behavioral transformations, such as tobacco use interventions, behavior change and health promotion.[2-4]

The aim of this study was to develop and evaluate a Virtual Teaching-Learning Environment (VLEA) aimed at training nurses from the Psychosocial Care Network in smoking management, with the aim of promoting continuing education and providing theoretical and practical support so that professionals can act effectively in approaching and treating people who want to quit smoking. In addition, the study sought to evaluate the Content Validity Index (CVI) of the AVEA using judges' scores and to assess the relevance and clarity of the materials developed, as well as the nurses' perceptions and performance when using the AVEA during training.[5]

METHOD

Type of Study

A methodological study with content validity analysis, using the Educational Design Research (EDR) method[6], aims to gain an in-depth understanding of the problem before developing prototypes, involving stakeholders. This approach makes it possible to develop practical and ecologically valid solutions adapted to the complexity of real environments.

The study was carried out online, from February 2022 to June 2024, with nurses from the Primary Health Care Network, including those with experience or interest in the topic. The invitation was disseminated via messaging apps and social networks, using the "snowball" sampling technique, in which initial participants, selected by specific criteria, expand the sample through referrals.[7]

The study was divided into three main phases:

1. **Phase 1:** Initial Diagnosis: A descriptive-exploratory phase was carried out to understand nurses' knowledge of their role in smoking management. Based on this diagnosis, the educational objectives for the VLEA were established.
2. **Phase 2:** Development and Evaluation of the VLEA: Based on the ADDIE Instructional Design Model (Analysis, Design, Development, Implementation, Evaluation)[8], the development and evaluation of the VLEA followed integrated stages:
   - **Analysis:** Identification of nurses' needs and definition of educational content in line with the Ministry of Health's booklets and manuals.
   - **Design:** Organization of the content into 10 sequential and complementary modules, focusing on nurses' role in tobacco control, and planning of learning objectives and interactive activities.
   - **Development:** Creation of educational materials, such as texts, videos and quizzes, adapted to the chosen digital platform.
   - **Initial Implementation:** Availability of the VLEA on a free online platform, with functional testing to check usability and coherence between modules.
   - **Evaluation by Judges:** Six specialists in Public Health, Nursing and/or Smoking evaluated the usability, audiovisual and pedagogical quality of the content.
   - **Review and adjustments:** Feedback from the judges was incorporated, improving the content and interface of the VLEA.
3. **Phase 3: Use of the VLEA by nurses:**
   - After the revisions, the VLEA was made available to nurses for testing.
   - They were invited to complete the training through the modules offered in the VLEA.
   - After completing the course, participants were invited to provide feedback on the usability, clarity and relevance of the content, as well as offering suggestions for future improvements to the learning environment.

VLEA evaluation details

The VLEA was evaluated by six experts to verify its suitability for the educational objectives, using criteria of usability, audiovisual quality (technical aspects) and content quality (pedagogical aspects). The evaluation tool followed the standards of the Brazilian Association of Technical Standards (ABNT), based on ISO/IEC 9126 and ISO/IEC 14598-6, which provide guidelines for the evaluation of software products, including virtual learning environments.[9]

The experts were asked to analyze the VLEA in two stages:

1. Technical Analysis of Content and Appearance Aspects: The evaluators examined the content of the VLEA based on three main criteria:
   - Relevance: Whether the content presented was relevant to the educational objectives set.
   - Comprehensiveness: Whether the material comprehensively covered the aspects necessary for training in smoking management.
   - Comprehensibility: Whether the content was easy to understand for the target audience (nurses), assessing the clarity and objectivity of the material.
2. In addition, technical aspects related to audiovisual quality, such as the quality of the videos and images, were analyzed to ensure that the technological resources used facilitated the learning process.
3. Comprehensive Course Evaluation: After the technical analysis, the experts carried out a broader evaluation of the environment, considering aspects such as:
   - Ease of Navigation: Analyzing whether the VLEA allowed intuitive navigation, without the need for technical assistance.
   - General Appearance: Evaluating the visual organization of the content, the design of the interface and the attractiveness of the visual elements.
   - Integration of Functions: Whether the different functionalities of the VLEA (videos, quizzes, forums) were adequately integrated and contributed to the learning experience.

Data Collection Instruments

Data was collected from expert judges using the SUS scale (System Usability Scale).[10] The SUS scale is widely used to assess the usability of interactive systems. Composed of 10 items on a five-point Likert scale, where 1 means "strongly disagree" and 5 "strongly agree", its score ranges from 0 to 100. The average of 68 points is the threshold for good usability: values above indicate a satisfactory experience, while values below suggest a need for improvement.

In addition to the quantitative evaluations, the judges were able to provide feedback in open-ended questions, suggesting improvements such as greater interactivity in the videos, standardization of terms and the addition of complementary materials, such as links to videos and external resources. These suggestions were documented and incorporated into the environment for improvement.

The nurses who evaluated the VLEA after the course answered questions such as "How satisfied are you with the training?", "How prepared are you to support cessation?", and "Would you recommend the course to other nurses?", using Likert scales and open-ended questions to offer opinions and suggestions on the content and format of the tool.

Data Analysis

Data analysis was carried out in two main stages: evaluation of the VLEA by the experts and analysis of the responses from the participating nurses, using descriptive and inferential statistical methods. The experts' scores were added up and the average for each criterion was calculated, as well as the Content Validity Index (CVI). Usability was measured using the SUS Scale. For the participants, the knowledge scores were assessed with a pre-test and post-test, using the Wilcoxon test, with a significance level of $p<0.05$. All data was organized and analyzed using Microsoft Excel®.

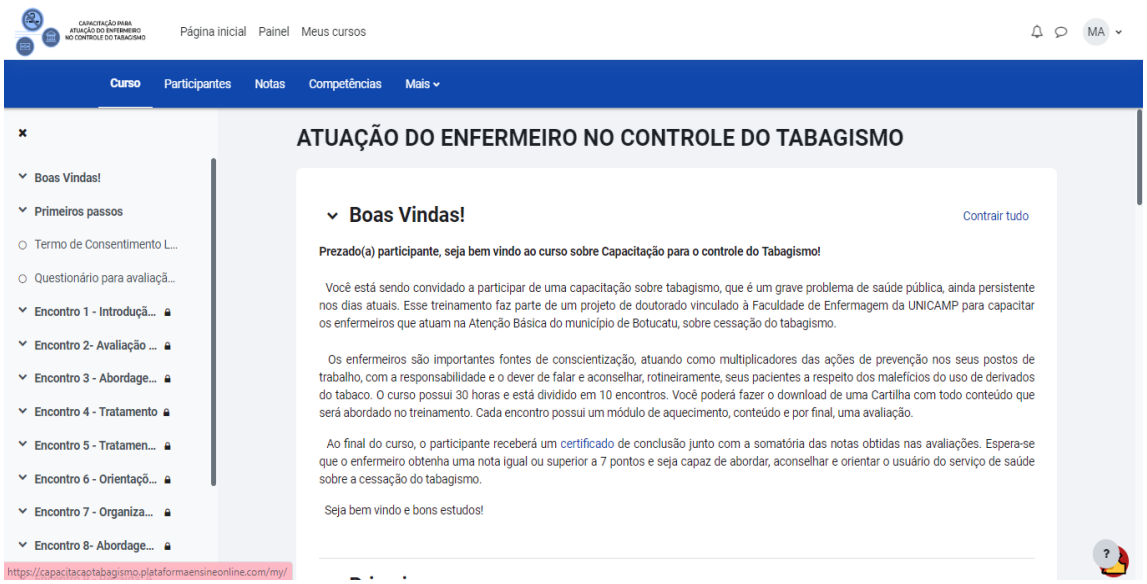
Ethical aspects

The project was approved by the Ethics Committee of the State University of Campinas (CAAE: 42625414.20000.5411) and all the participants signed an informed consent form.

RESULTS

After the VLEA was developed, as shown in Figure 1, it was made available on the online platform and accessed by 106 nurses, 16 of whom completed the course and were issued with a certificate of participation. The platform was organized into modules, following the structure defined in the ADDIE plan, and the content was presented interactively, with videos, booklets, case studies and supplementary materials.

Figure 1 - Initial screen for accessing the Virtual Learning Environment for Training in Smoking Cessation. Campinas, SP, Brazil, 2024



Experts' evaluation of the VLEA

The VLEA was evaluated by six experts, with five completing all stages of the evaluation. The questionnaire used for the experts included a Likert scale from 1 to 5, covering usability issues and content relevance. The experts' average score was 85 points on the SUS scale, with 92.5 being the highest score and 70 the lowest. The results show that the experts considered the VLEA to be easy to use and relevant to the training of nurses, as shown in Table 1.

Table 1 - Comprehensive evaluation of training by experts according to the SUS Scale and Complementary Evaluation of the course. Campinas, SP, Brazil, 2024

Questions	Expert (N=5)				
	1	2	3	4	5
1. I think I would like to use this system often	5	4	4	4	4
2. I found the system too complex	1	4	1	1	1
3. I found the system easy to use	4	5	5	4	4
4. I think I would need the support of a technician to use the system	1	4	1	2	2
5. I thought the various functions of this system were well integrated	4	4	5	4	4
6. I thought there was a lot of inconsistency in this system	1	1	1	2	2
7. I imagine that most people would learn to use this system quickly	4	5	5	4	4
8. I found the system very complicated to use	1	1	1	3	2
9. I felt very confident using the system	5	4	5	3	2
10. I would need to learn a lot of things before using the system	1	1	1	3	2
Score	**92,5**	**77,5**	**97,5**	**70,0**	**72,5**
	Expert (N=5)				
Complementary Assessment	**1**	**2**	**3**	**4**	**5**
11. Is the look of the course pleasant?	4	4	5	4	5
12. Are the course and module introductions clear?	5	5	5	5	5
13. Are the items that make up the course organized?	5	5	5	5	5
14. Do the links work correctly?	5	5	4	5	5
15. Can you find the help icon where you can contact us if you have any questions?	5	5	5	5	2
16. Are the topics chosen in the modules relevant?	5	5	5	5	5
17. Is it possible to carry out the proposed activities following the instructions and using the available teaching materials?	4	5	5	5	5
18. Is it possible to understand the content?	5	5	5	5	5
19. Is the content presented in a way that motivates you to continue with the course?	4	5	5	-	5

Questions	Expert (N=5)				
	1	2	3	4	5
20. Does the course succeed in showing the importance of the knowledge acquired?	4	5	5	-	5
21. Do the buttons and icons correspond to the functionalities?	5	5	5	5	5
22. Are the visual elements (colors, styles and images) of the VLEA attractive?	3	5	5	5	5

In addition, the experts made suggestions about improving the interactivity of the videos and standardizing some technical terms. All the suggestions were taken on board and implemented before the training was finally made available.

Participant profile

Of the 16 participants who completed the course, 15 (93.75%) were female and one (6.25%) male. The majority had a specialization degree - six (37.50%) - or only an undergraduate degree - four (25%). The average age was 42.94 years, with an average time in the job of 7.31 years, ranging from 1 to 23 years. Table 2 summarizes the profile of the participants.

Table 2 - Description of the qualitative and quantitative variables of the training participants. Campinas, SP, Brazil, 2024

Variable / Biological sex	N(16)	%
male	1	6,25
female	15	93,75
Professional training		
undergraduate	4	25,00
specialization	6	37,50
residency	2	12,50
master	2	12,50
doctorate	2	12,50
Marital status		
No partner	3	18,75
married	10	62,50
divorced	3	18,75
Position in the institution		
care	6	37,50
RT	5	31,25
coordination	5	31,25

Variable	N(16)	%
Biological sex		
Have another relationship		
yes	2	12,50
no	14	87,50

Academic Performance

The participants were assessed throughout the modules with questionnaires and case studies. The average performance in Meeting 4 was 8.59 (SD = 1.28), while in Meeting 5 the average was 9.00 (SD = 1.06). In Meeting 6, the participants achieved an average of 9.69 (SD = 1.25). These results demonstrate good academic performance throughout the training. Table 3 summarizes the scores for the meetings.

Table 3 - Description of the academic performance variables of the training participants (n=16).Campinas, SP, Brazil, 2024

Variable	Mean (SD)	Median (IQR)= Q3-Q1	Variation
age	42,94 (8,04)	42,00 (10)	28-57
Time working in the position	7,31 (6,65)	6,00 (7,50)	1-23
Time working at the institution	7,99 (8,40)	14,50 (12,25)	0,30-26
Final score meeting 4	8,59 (1,28)	7,50 (2,50)	7,5-10
Final score meeting 5	9,00 (1,06)	9,33 (2)	7,33-10
Final score meeting 6	9,69 (1,25)	10,00 (0)	5-10
Log days	33,00 (9,04)	34,50(13)	14-47

The participants' knowledge was measured using a pre-test and a post-test. The average knowledge score in the pre-test was 11.00 (SD = 2.48), while in the post-test there was a significant increase, with the average reaching 14.88 (SD = 0.81). The difference between the scores was statistically significant ($p < 0.001$), demonstrating that the training was effective in increasing knowledge about smoking management. These data are summarized in Table 4.

Table 4 - Participants' knowledge score before and after training. Campinas, SP, Brazil, 2024

Variable	Time	Average	Median	p-value*
Score Knowledge	Pre	11,00 (2,48)	11,50 (3,5)	**0,0001**
	Post	14,889 (0,81)	15,00 (1)	

At the end of the training, 14 (87.5%) of the 16 participants filled in the evaluation questionnaire. All of them recommended the course, and 12 of them (85.71%) thought the duration was adequate. The participants expressed satisfaction with the training, found the duration adequate, felt confident to support cessation and confirmed that their expectations had been met.

They highlighted the intuitiveness of the platform and the approach to primary and hospital care topics.

DISCUSSION

The construction of the VLEA to train nurses in smoking cessation reflects advances in remote teaching as a continuing education strategy, democratizing access to knowledge and increasing flexibility for working professionals. In line with technological advances, this model facilitates distance learning, meeting the constraints of time and location, with greater accessibility and interactivity between professionals from different contexts and regional realities.[11,12]

Ease of use is essential for a VLEA to achieve its objectives, allowing nurses to engage productively and obtain the expected results. This format, compared to traditional methods, offers a number of educational resources that increase knowledge retention and make learning more dynamic. During the COVID-19 pandemic, this modality has gained relevance, with institutions adapting curricula to the online format, expanding the reach of teaching and minimizing interruptions. [13]

Nurses occupy a strategic position in smoking cessation, being effective even in brief interventions during clinical care. However, many still do not consistently address smoking, underutilizing its potential to influence patient behavior. Studies such as that by Mak et al. (2018) highlight the importance of training nurses in smoking interventions, which expands their role. Moxham also emphasizes the crucial role of nurses in promoting public health and changing behaviors by influencing social practices related to smoking [13-15].

The findings of this study reinforce the VLEA as an effective teaching resource, encouraging a participatory attitude among students, with access to varied materials and critical reflection. This virtual environment facilitates the construction of practical and reflective skills, aligning training with the demands of health care and promoting a critical view of smoking.[16,17]

It was well evaluated by the judges and nurses and had good usability results according to the SUS scale. The development and evaluation of the VLEA for training nurses in smoking cessation followed the ADDIE model, allowing for efficient and accessible organization of the content. The VLEA was adapted to the needs of Primary Care and Hospital professionals, promoting continuing education and strengthening their skills in treating smoking patients.

The study achieved its objective of evaluating the Content Validity Index (CVI), with values higher than 0.80, reflecting high agreement between experts on the relevance and clarity of the content, confirming its suitability for the Ministry of Health guidelines. The nurses' perceptions and performance in using the VLEA were also assessed. The participation of 106 nurses, with 16 finishing the course and providing feedback, was crucial to improving the virtual environment, indicating its relevance to clinical practice and suggesting adjustments that improved the content and usability of the system.

The process of developing the VLEA to train nurses on smoking, described in this study, shares several methodological similarities and objectives with the development of other learning objects, such as the Virtual Learning Object (VLEA) developed with a focus on elimination intestinal stomas18 and another study on VLEA for the care of hospitalized elderly people.[19]

The study on the VLEA for intestinal stomas and the VLEA for the care of hospitalized elderly people, as well as the VLEA on smoking, followed the ADDIE Instructional Design approach, involving stages of planning, construction, validation and analysis. Although they have different target audiences - focusing on specific clinical areas in the case of stomas and geriatric care, and on smoking cessation for nurses from the Psychosocial Care Network - all the projects emphasize Continuing Education as central to improving professional practice through educational technology.[18,19]

The studies differ in target audience and theme: while the VLEA on smoking was created to train nurses in smoking cessation in various areas of the Psychosocial Care Network, the OVA on intestinal stomas and the VLEA for care of the hospitalized elderly focused on specific clinical areas, such as stoma management and geriatric care. All of them, however, prioritize continuing education, with the aim of improving professional practice through the use of educational technology.

In the validation process, the three studies involved specialists to ensure pedagogical and ergonomic quality, using Likert Scales to assess criteria such as usability, clarity and content organization, ensuring the robustness of the platforms. Just as the VLEA for elderly care used Moodle, the VLEA on smoking opted for a similar platform, highlighting accessibility and flexibility, allowing asynchronous access and adapted to the pace of professionals, valuing distance education. In the VLE for the care of hospitalized elderly people, changes

were made to the lessons and materials in line with the experts' suggestions, especially in the visual presentation and organization of the content. Similarly, the VLEA on smoking underwent improvements in interactive activities and forms of assessment, highlighting the importance of continuous adjustments based on feedback from experts and users.[18,19]

When comparing the development of the VLEA on smoking with other studies of educational interventions for smoking cessation, similarities and contrasts emerge, especially in the use of educational technologies and content validation. Both studies aim to train nurses to work in smoking cessation, using innovative methods for continuing education, but with different approaches.[20]

While one study used an innovative and low-cost hybrid approach (online and face-to-face), the present study adopted an exclusively online format based on the ADDIE model, focusing on flexibility for professionals in the Psychosocial Care Network. Although both encourage continuous training and autonomous learning, Boni's hybrid approach facilitates the exchange of face-to-face experiences, while the current VLEA promoted critical reflection through online forums and collaborative activities.[20]

Both studies demonstrated rigor in content validation. In the present study, specialists in public health and smoking used the SUS Scale to assess usability and quality, while the study by Boni et al. validated the content with 12 specialists, adopting a consensus criterion of 80%. In both cases, validation was crucial to adjusting the materials and ensuring the pedagogical robustness of the interventions.[20]

The Content Validity Index (CVI) is a common metric in learning object validation studies. Although Boni et al. do not explicitly use the CVI, their criterion of 80% consensus among experts is comparable in methodological rigor. Both studies, including the VLEA on smoking, highlight the importance of adapting content to Ministry of Health guidelines and recommended practices, ensuring that health professionals have access to up-to-date, evidence-based information. In addition, the usability results were positive in both cases; the SUS Scale in the present study had an average score of 85, indicating good usability, while Boni et al. reported 65% approval from professionals for the hybrid course, confirming the efficiency of the online platforms in both studies.[20]

The results indicate that the VLEA for training nurses in smoking cessation achieved its objectives, promoting permanent education and providing effective theoretical and practical support. Content validation and positive feedback from participants highlight its pedagogical robustness and relevance to clinical practice. The VLEA was considered viable, with a higher score on the SUS Scale, comparing favorably with other educational initiatives. The study contributes to health education and paves the way for replicating technological strategies in other areas.

Study limitations

The small sample size in the evaluation phase may limit the generalizability of the results. The exclusively online training may have restricted direct interaction between professionals, and the absence of a hybrid approach may have limited collaborative learning. In addition, the evaluation was based on quantitative instruments, without exploring qualitative aspects of the users' experience, which would enrich the understanding of the applicability of VLEA in clinical practice. Future studies could expand the sample, adopt mixed methods and test the VLEA in different scenarios to improve the generalizability of the results.

CONCLUSION

The VLEA developed for training nurses in smoking has proved to be an effective tool for promoting continuing education, facilitating access to relevant content for smoking cessation in the different care services. The development process, based on the ADDIE Instructional Design Model, ensured the methodological organization needed to create an accessible and highly usable educational environment, with an average score of 85 on the SUS Scale, confirming the satisfaction of specialists with the environment.

Validation pointed to the relevance and clarity of the content, with CVIs above 0.80, indicating that the VLEA meets the expected pedagogical standards. In addition, the alignment of the content with Ministry of Health guidelines reinforces the practical applicability of the VLEA, providing nurses with evidence-based training adapted to the reality of the Unified Health System (SUS).

In summary, the VLEA represents an important contribution to the training of health professionals in the approach to smoking, with the potential to be replicated in other contexts and adapted to different areas of health. The continuation of this type of educational intervention can make a significant contribution to strengthening tobacco control policies and improving the care provided in the RAPS.

REFERENCES

1. Word Health Organization: Tobacco [Internet]. [cited 2024 oct 28]. Available from: https://www.who.int/news-room/fact-sheets/detail/tobacco.

2. Li M, Koide K, Tanaka M, Kiya M, Okamoto R. Factors associated with nursing interventions for smoking cessation: a narrative review. Nurs Rep. [Internet]. 2021[cited 2024 oct 28];11(1). Available from: https://doi.org/10.3390/nursrep11010007.

3. Kazemzadeh Z, Manzari ZS, Pouresmail Z. Nursing interventions for smoking cessation in hospitalized patients: a systematic review. Int Nurs Rev. [Internet]. 2017 [cited 2024 Oct 28];64(2). Available from: https://doi.org/10.1111/inr.12320.

4. Boni FG, Osmarin VM, Juchem BC, Mantovani VM, Echer IC. Nursing in front of the hospitalized smoking patient: diagnosis and interventions established in clinical practice. Rev Pesqui Cuid é Fundam Online. [Internet]. 2021[cited 2024 oct 28];13. Available from: https://seer.unirio.br/cuidadofundamental/article/view/9993.

5. de Oliveira AE, de Godoy I. Conhecimentos e práticas do enfermeiro para cessação do tabagismo: Conhecimentos e práticas para cessação do tabagismo dos enfermeiros da rede de atenção à saúde de Botucatu [Mestrado em Saúde Coletiva]. Botucatu (Brasil): Universidade Estadual Paulista; 2017.[acesso 28 de outubro 2024]. Disponível em: https://repositorio.unesp.br/server/api/core/bitstreams/06b8a8ba-def1-44aa-b703-6f34824e2bd2/content.

6. McKenney S, Reeves TC. Educational design research: portraying, conducting, and enhancing productive scholarship. Med Educ. [Internet] 2021 [cited 2024 oct 28]; 55(1). Available from: https://doi.org/10.1111/medu.14280.

7. LeBlanc AG, Barnes JD, Saunders TJ, Tremblay MS, Chaput JP. Scientific sinkhole: estimating the cost of peer review based on survey data with snowball sampling. Res Integr Peer Rev. [Internet]. 2023 [cited 2024 oct 28];24;8(1). Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC10122980/

8. Filatro A. Design Instrucional Contextualizado. São Paulo: Senac; 2004.

9. Dias R de F. Ambientes virtuais de aprendizagem: uma metodologia para avaliação de software [Mestrado em Engenharia de Produção].Santa Catarina (Brasil): Universidade Federal de Santa Catarina; 2003. [acesso em 28 de outubro 2024]. Disponível em: https://repositorio.ufsc.br/bitstream/handle/123456789/84931/224826.pdf?sequence=1&isAllowed=y.

10. Brooke J. SUS: A "quick and dirty" usability scale. Usability Evaluation in Industry. [Internet]. 1996. [cited 2024 oct 28]11. Available from: https://www.researchgate.net/publication/319394819_SUS_--_a_quick_and_dirty_usability_scale.

11. Vilas Boas Fratucci M, De Araujo ME, Zilbovícius C, Frias AC. Ensino à distância como estratégia de educação permanente em saúde: impacto da capacitação da equipe de Estratégia de Saúde da Família na organização dos serviços. Rev Bras Aprendiz Aberta Distância. [Internet]. 2016 [acesso em 28 de outubro 2024]24(15). Disponível em: http://seer.abed.net.br/index.php/RBAAD/article/view/274.

12. Sandhu P, de Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. Med Educ Online. [Internet]. 2020 [cited 2024 oct 28];25(1). Available from: https://doi.org/10.1080/10872981.2020.1764740.

13. Ferreira DM, Oliveira JL de, Barbosa NG, Lettiere-Viana A, Zanetti ACG, Souza J de. Influência do ambiente virtual de aprendizagem no desempenho acadêmico de estudantes de enfermagem. Acta Paul Enferm. [Internet]. 2022 [acesso em 28 de outubro 2024];17(35). Disponível em: https://doi.org/10.37689/acta-ape/2022AO0247345.

14. Moxham L, Thomas T, Curtis E, Mackay M, Pratt H, Livingstone K. Nursing students attitudes, behavior, and knowledge toward smoking cessation: results from a descriptive survey at a regional university. Nurse Educ Today. [Internet]. 2023 [cited 2024 oct 28];125:105798. Available from: https://doi.org/10.1016/j.nedt.2023.105798.

15. Mak YW, Loke AY, Wong FKY. Nursing intervention practices for smoking cessation: a large survey in Hong Kong. Int J Environ Res Public Health. [Internet]. 2018 [cited 2024 oct 28];15(5). Available from: http://dx.doi.org/10.3390/ijerph15051046.

16. Wu J, Guo R, Wang Z, Zeng R. Integrating spherical video-based virtual reality into elementary school students' scientific inquiry instruction: effects on their problem-solving performance. Interact Learn Environ. [Internet]. 2021[cited 2024 oct 28];29(3). Available from: https://doi.org/10.1080/10494820.2019.1587469.

17. Annansingh F. Mind the gap: Cognitive active learning in virtual learning environment perception of instructors and students. Educ Inf Technol. [Internet]. 2019 [cited 2024 oct 28];24(6). Available from: https://doi.org/10.1007/s10639-019-09949-5.

18. Braga CSR, Andrade EMLR, Luz MHBA, Monteiro AKC, Campos MOOB, Santos E Silva FM, et al. Construction and validation of a virtual learning object on intestinal elimination stoma. Invest Educ Enferm. [Internet]. 2016 [cited 2024 oct 28];34(1). Available from: https://doi.org/10.17533/udea.iee.25996.

19. Campagnollo C, Souza AIJ de, Tourinho FSV, Tomasi AVR, Nunes SFL, Capellari G, et al. Development and evaluation of a virtual learning environment for continuing education of the nursing team for the care of hospitalized elderly. Braz J Hea Rev. [Internet]. 2021 [cited 2024 oct 28] 28;4(3). Available from: https://doi.org/10.34119/bjhrv4n3-338.

20. Boni FG, Silva LDBD, Grigolo JI, Boaz SK, Cogo ALP, Echer IC. Blended learning in permanent education of nursing professionals on smoking cessation. Rev Gaúcha Enferm. [Internet]. 2021 [cited 2024 oct 28];42(spe):e20200183. Available from: https://doi.org/10.1590/1983-1447.2021.20200183.