Original Article

Cervical cancer tracking virtual learning object
Objeto virtual de aprendizagem sobre rastreamento do câncer do colo do *útero cervical cancer tracking virtual learning object*
Objeto virtual de aprendizaje sobre rastreo de cáncer de cuello uterino
cervical cancer tracking virtual learning object

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Abstract

Objective: To describe the content development and assessment of a virtual learning object on cervical cancer prevention and tracking.

Methods: Applied technological development research carried out in three stages: scientific content elaboration; theoretical content assessment with 21 nurses through online Delphi Panel and virtual learning object construction.

Results: The virtual learning object has 7 modules, 65 content screens, with a total workload of 60 hours. The content assessment showed an agreement above 0.80, being considered adequate.

Conclusion: This technology is a motivating alternative for health education, capable of optimizing information dissemination on the handling and collection of the preventive, improving the quality of care and cervical cancer prevention.

Resumo

Objetivo: Descrever o desenvolvimento e avaliação do conteúdo de um objeto virtual de aprendizagem sobre prevenção e rastreamento do câncer do colo do útero.

Métodos: Pesquisa aplicada de desenvolvimento tecnológico realizada em três etapas: elaboração do conteúdo técnico científico; avaliação do conteúdo teórico com 21 enfermeiros por meio de Painel Delphi online e construção do objeto virtual de aprendizagem.

Resultados: O objeto virtual de aprendizagem possui 7 módulos, 65 telas de conteúdo, com carga horária total de 60 horas. A avaliação do conteúdo apresentou concordância acima de 0,80, sendo considerado adequado.

Conclusão: Essa tecnologia é uma alternativa motivadora de educação em saúde, capaz de otimizar a difusão da informação sobre o manuseio e coleta do preventivo, melhorando a qualidade da assistência e a prevenção do câncer do colo do útero.

Resumen

Objetivo: Describir el desarrollo y evaluación de contenido de un objeto virtual de aprendizaje sobre prevención y rastreo de cáncer de cuello uterino.

Métodos: Estudio aplicado de desarrollo tecnológico realizado en tres etapas: elaboración del contenido técnico científico, evaluación del contenido teórico por 21 enfermeros mediante el Panel Delphi en línea y construcción del objeto virtual de aprendizaje.

Resultados: El objeto virtual de aprendizaje posee 7 módulos, 65 pantallas de contenido, con una carga horaria total de 60 horas. La evaluación del contenido presentó concordancia superior a 0,80 y fue considerado adecuado.

Conclusión: Esta tecnología es una alternativa motivadora de educación en salud, que tiene la capacidad de optimizar la difusión de la información sobre la toma de muestra de Papanicolau y su manipulación y mejorar la calidad de la atención y prevención de cáncer de cuello uterino.

Introduction

Cancer is a public health problem, especially among developing countries. In relation to cervical cancer in the 2018-2019 biennium, in Brazil, 16,370 new cases are estimated for each year, with an estimated risk of 15.43 cases per 100 thousand women, occupying the third position in the ranking of estimates of new cancer cases for the year 2018, according to sex and primary location.[1]

Early detection of cervical cancer, using cytopathological examination (Pap test), to identify precursor lesions and diagnose the disease early leads to a decrease in morbidity and mortality rates, as early diagnosis has a high cure rate.[2] Success in tracking for cervical cancer and its precursor lesions depends on the diagnostic accuracy of the exam, the quality of the assistance in collecting the test being essential, as well as the training and updating of the professional in relation to current methods and protocols. In this perspective, digital educational technologies are being increasingly used as strategies for continuing or continuing education for the technical improvement of health professionals. [3-5]

Educational technologies include scientific knowledge obtained through planning, control, production and execution in a systematic set that involves the entire formal and informal educational process between the educator and the student.[6] There is a diversity of technologies such as games, applications, hypertext, hypermedia, high-fidelity simulator mannequin, simulator in virtual environment, videos, complete courses, virtual learning object (VLO), websites, chats, blogs, forums, teleconferencing and web conferencing. Digital technology allows for an independent, flexible study, develops different skills, contributes to the autonomy of learning, the association of theory with practice, and meaningful learning. [4,5]

VLO is a technological resource with multimedia support and reusable hypermedia language for interactive learning through educational material with didactic content and animations, permeated by interdisciplinarity, interactivity, in addition to complements and exercises.[7] Hypermedia is the set of several computerized information media with text, sound, graphics and/or video, interconnected by non-linear logical chains that allow users to follow great paths through the material and also the systems used to create and display this information. [8-10]

VLO offers the advantages of being able to be done remotely, having flexibility and the possibility for the student to manage his place and time of study according to his needs and favors the independent access of the regional characteristics of urban centers or remote places.[4,5,7,9,10] Faced with these questions, it is questioned what content should contain an VLO on cervical cancer prevention and tracking? Thus, this study aims to describe the development and assessment of a VLO content on cervical cancer prevention and tracking.

Methods

This is an applied research[11] of technological development carried out in three stages: 1) theoretical content elaboration; 2) theoretical content assessment; 3) VLO construction.

The Ministry of Health manuals were used to elaborate the VLO content (Primary Care Notebook nº 13: control of cervical and breast cancers; Estimate 2018: incidence of cancer in Brazil, Data from population-based records - Vol. IV; Nursing actions for cancer control: a proposal for teaching-service integration and the Brazilian nomenclature for cervical reports and recommended conduct: recommendations for health professionals); Brazilian Society of Gynecology and Obstetrics guidelines; and textbooks of gynecology and nursing.

Learning verification activities were also developed, composed of questions or case studies with multiple choice questions. These activities were corrected by a pedagogical professional. The content was proofread by a team of licensed Portuguese teachers. The content was prepared from March to July 2018. The entire stage of elaboration and illustration of the educational technology was done with the collaboration of a design team.

The content assessment was carried out by judges, through a Delphi online panel, from August to October 2018. There is no established standard in the scientific literature regarding the criteria for defining the number and characteristics of the judges. Thus, the importance of selecting health professionals who have clinical experience and theoretical knowledge on the subject is highlighted.[12]

The group of judges was formed by nurses working in primary health care, teachers and nurses with experience of at least two years in one of the fields of interest: women's health, obstetric or gynecological nursing. The judges were selected through the researchers' contact network using the snowball sampling technique, therefore, it was a convenience sampling. The judges received an e-mail with an invitation letter with information regarding the study. Upon acceptance, all judges signed the Informed Consent Form and received a virtual instrument on the Google Form.

In the assessment instrument organized by content/screens, the judge could mark one of the options: "Adequate", "Partially adequate" and "Inadequate" for each screen. The 80% index was adopted as a minimum level of consensus. The situations that presented inferior agreement should be reformulated, the suggestions accepted and sent back to the judges, for a new assessment until reaching 80%.[12]

In the third stage, VLO was developed using Fred platform, developed by the Laboratory and Observatory of Project Ontologies (LOOP◊ - *Laboratório e Observatório de Ontologias Projetuais*) of *Universidade Federal do Espírito Santo* (UFES), from March to June 2019. This platform implements personalized instruction systems (PIS), as defined by Keller[13] and enhanced by the advancement of dis-

tance learning via internet in the last decade.[14] The principles of PIS[15] present on the platform guided the design of the course through personalization of instructional objectives, the environment of VLO's tasks and activities, the level of mediation of instruction by the platform, forms of assessment and reflections of the learner about their progress.

The study was approved by the Research Ethics Committee of the Health Sciences Center of UFES, under number CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 57930016.0.0000.5060.

Results

To elaborate the VLO content, the Ministry of Health and societies national guidelines were used, since they are based on the best evidence and good practices. The content architecture of VLO was organized into seven modules, the first of which was presented with the pre-test, five modules with theoretical content and the last with the post-test and certificate issuance. This VLO aims to be a complementary tool in the training and qualification of nurses/health professionals about cervical cancer prevention and tracking.

A learning verification activity, consisting of questions or case studies that address multiple choice questions, is found at the end of each screen. In total, 53 questions were prepared and distributed during VLO. Screens use illustrations, photos, infographics and videos according to the nature of the content.

VLO has a total workload of 60 hours. Users can take the modules independently or sequentially and repeat the modules as many times as necessary. VLO presentation and finalization module contains 26 pre-test and post-test questions, the same questions being applied at the beginning and at the end, to assess the assimilation of the content proposed by hypermedia, based on the increase of correct answers in the questions. At the end a certificate is automatically issued with the total workload.

In the assessment stage, 30 judges 21 were invited and responded to the email. The judges had

the following profile: 12 (60%) were over 40 years old, 16 (86%) were female, and all had at least nine years of academic training in one of the fields of interest: women's health (13.5%), obstetric or gynecological nursing (27.1%) or in Primary Health Care (59.4%).

Through the instrument, the judges assessed the content of each module organized on screens.

All screens of the content modules were assessed in the first round with more than 90% agreement between the 21 nurse judges, with no further rounds required, as described in chart 1.

In the construction stage, Fred platform was used, which has easy navigability. Access to VLO occurs through the website CuidarTech®, after users register themselves, generating a login and password.

Chart 1. Content structure of the Virtual Learning Objective and Content Validity Index

Modules	Screens	Content	CVI
Module I What is Cancer	Screen 1	Educational technology to update cervical cancer tracking	100.0
	Screen 2	VLO program content	100.0
	Screen 3	Presentation screen	100.0
	Screen 4	Credits screen	100.0
	Screens 5 and 6	Content Screens: Definition on cancer	100.0
	Screen 7	Tissue Growth	100.0
	Screen 8	Oncogenesis	100.0
	Screen 9	Tumor Immunology	100.0
	Screens 10 and 11	Classification/Bbological behavior	100.0
	Screens 12 and 13	Nomenclature	100.0
Module II Cervical Cancer Epidemiology in Brazil and Worldwide	Screens 14 and 15	Cancer epidemiology	100.0
	Screens 16 and 17	Cervical cancer epidemiology in Brazil and worldwide	100.0
Module III Risk Factors for Cervical Cancer	Screens 18 and 19	Risk factors	95.2
Module IV Cervical Cancer Prevention and Female Genital Self-Examination	Screens 20 and 21	Cervical cancer prevention	100.0
	Screens 22 and 23	Female genitalia self-examination	95.2
Module V Cervical Cancer Control and Pap Smear	Screens 24 and 25	Cervical cancer control	100.0
	Screen 26	Pap smear: History	100.0
	Screens 27	Objective	100.0
	Screens 28, 29 and 30	Materials used/speculum types	100.0
	Screens 31 and 32	Fixing the material to the blade with spray and alcohol /Recommendations	95.2
	Screen 33	Spatulas/Brushes	100.0
	Screen 34	Filling in the SISCAN form/Slide identification	95.2
	Screens 35 and 36	Exam technique	95.2
	Screens 37, 38 and 39	Ectocervical collection/endocervical collection/Schiller test	100.0
	Screens 40 and 41	Fixing the material/Recommendations	95.2
	Screens 42 and 43	Exam reading and interpretation	90.5
	Screens 44 and 45	Main findings in Pap smear: Unsatisfactory sample for assessment/Satisfactory sample for assessment/Recommendations	95.2
	Screens 46 and 47	Special situations: Pregnant women/Recommendations/Postmenopausal/Recommendations/Hysterectomized/Recommendation	95.2
	Screens 48 and 49	Normal Result/Within normal limits in the material examined/Recommendations/Benign cellular changes (reactive or repair) Inflammation without agent identification/Recommendations	100.0
	Screens 50, 51 and 52	Result indicating immature squamous metaplasia/Recommendations/Result indicating repair/Recommendations/Result indicating atrophy with inflammation/recommendations/Result indicating radiation/Recommendations/Microbiological findings/Recommendations	95.2
	Screens 53, 54, 55 and 56	Special situations/Atypias of undetermined meaning in squamous cells/Atypical squamous cells of undetermined meaning, possibly non-neoplastic/Recommendations	90.5
	Screens 57 and 58	Vaginal discharge/Vaginal discharge etiology	100.0
	Screens 59 and 60	Examination of internal and external female genitalia	100.0
	Screens 61 and 62	Genitoperianal observation	100.0
	Screens 63 and 64	Vaginal touch or combined touch	100.0
	Screens 65	Nursing record in gynecological consultation	95.2

Content Validity Index (CVI); Cancer Information System (SISCAN)

To access it is necessary to choose on the Home Page (Figure 1) the course "Nursing Consultation in Gynecology: focus on the collection of the preventive". Users, when clicking, see the screen with the seven modules, as shown in figure 2.

Figure 1. VLO Home

Figure 2. Presentation screen of VLO modules

By clicking on "Course presentation", users have access to pre-test (Figure 3). After performing the pre-test, they can access any of the five content modules according to users' learning needs or interests. At the end, in the module "Finalization of the course", the post-test questions are included. The tests present 26 questions for knowledge assessment.

Figure 3. Screens "Course Presentation and Finalization" with pre and post-test

Regarding the navigability of VLO, as noted in module 1 - "What is cancer" with the topic "Definition about cancer" (Figure 4), after viewing the written content and the infographic, students will move to the next screen, being necessary to click on the "next" item at the top of the screens. When completing module 1, users can access any of the other content modules.
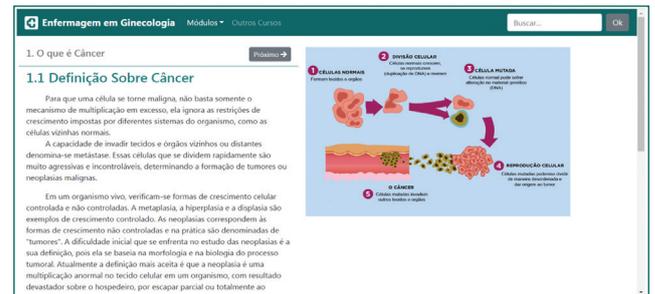
Figure 4. VLO's "Definition on Cancer" Screen

Discussion

This VLO was idealized amidst a worldwide scenario in which distance learning has gained strong evidence as an innovative method in continuing education programs, which recognizes the difficulties in the availability of time by health professionals.[16-18] It was proposed to offer an innovative product for teaching in gynecology, with the purpose of updating nurses, with an emphasis on the importance of carrying out procedures properly, in reading and interpreting the examination report and determining conduct.

The collection of the preventive exam is considered the most effective means for the diagnosis of cervical cancer, considering that most cases occur silently, which makes it necessary to act with competence, skill and accuracy in the exam collection for tracking.[19-21]

The suitability of the material sample is largely related to the performance of professionals in performing the collection technique, characterized basically by manual work, which ranges from collection to the issuing of the report by the analysis laboratory. The training and updating of the technique allow to correct flaws in this process

and, consequently, increase the number of satis-factory slides, allowing the detection of pre-malignant lesions early, with a positive impact on the municipalities that attend the cervical cancer tracking program. [22]

The choice of VLO modules took into account the need for professional updating, the improvement of knowledge and the formation of critical thinking for decision making based on the results found. Bearing in mind that critical thinking is essential for conducting a safer and more efficient clinical practice. [20]

The use of illustrations, animations, infographics and audio made hypermedia lighter and more effective for understanding, according to the judges' assessments and comments. The possibility of offering more detailed and attractive information, in addition to the flexibility of use, makes hypermedia a dynamic tool for the teaching-learning process. [7,17,18]

In assessing the content, the judges highlighted as important factors of VLO: the objectives proposed in a concise manner, the way of presenting the subject, the images for the correct collection of the preventive, the fidelity of the presented theme and the possibility of encouraging critical thinking in health professionals. All of these issues and the need for continued training of health professionals in different locations provide evidence to envision the potential for using this VLO as a new educational space.[20]

The technologies used for distance learning enable health professionals to access information easily and update the topic quickly, allowing access to various locations, including the workplace. The functioning of the chosen platform allows professionals to study and progress in the content at their own pace and availability of time for study.[14] Factors that denote some special characteristics of an VLO, important to the contribution to the teaching-learning process in health.[5,16,17]

It is pointed out the potential of this VLO to be used in higher education in nursing as a complementary tool in the teaching-learning of this topic. Research on development and assessment of digital educational technologies for undergraduate nursing students has grown over the years, pointing out the advantages of its use and addressing different contents such as peripheral venipuncture, nursing assistance for habitual risk delivery, sexually transmitted diseases, oxygen therapy, nursing process, intensive care, medication administration, vital signs, male and female bladder catheterization, puncture, heparinization of fully implanted catheter, among others.[4,5,8-10,16]

As in continuing education, educational technologies can be incorporated into nursing education with the purpose of collaborating in the development of competences and skills, apprehension of contents inherent to professional practice, encouraging an interactive, innovative and flexible teaching-learning process. On the other hand, it is understood that the digital technologies applied in undergraduate nursing bring challenges for teachers and students, with regard to organizing specific activities and with a different structure from those applied in face-to-face spaces, the content must have a logical sequence, with a self-explanatory and dynamic approach, activities need to involve and motivate students to learn by integrating their previous experiences and knowledge.[3-5,8-10,16-18]

It is worth highlighting the importance of multidisciplinary work in developing educational technologies, so in the construction and assessment of this VLO a team of professionals from design, programming, pedagogy, languages and linguistics, nurses and other health professionals were involved. Thus, with regard to its pedagogical approach, care is taken in the development of technological material with educational objectives, based on a dynamic and structured pedagogical foundation.[7,9,16,17]

Contributions to nursing, health, and public policies

VLO development is a technological resource to collaborate in training and updating health professionals, especially nurses, regarding the technique of collecting cervical cancer preventive exam and enabling the acquisition of new knowledge and skills by nursing students.

Conclusion

VLO for training in cervical cancer prevention and tracking has seven modules and 65 screens, with videos, infographics, images and texts. Content assessment reached an index higher than 80% among the judges, pointing out content quality and adequacy. Thus, this hypermedia is a viable and timely tool to be used in distance education and training. As a digital educational technology, VLO can be applied to nursing professionals and academics, due to its innovation and relevance in the context of cervical cancer tracking in the country. The need for studies to assess the effectiveness of technology in the learning of different users and educational contexts is pointed out as a limitation.

Acknowledgments

Collaborations

Davilla MSD, Primo CC, Almeida MVS, Leite FMC, Sant'Anna HC, Jensen R and Lima EFA declare that they contributed to project design, data analysis and interpretation, article writing, relevant critical review of intellectual content and final approval of the version to be published.

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