

Construction and validation of a virtual learning object on intestinal elimination stoma

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Development and validation of a virtual learning object on intestinal elimination ostomy

Objective. To construct and validate a virtual learning object (VLO) on intestinal elimination

stoma. **Methods.** Applied, descriptive and quantitative study. In 2014, eight stoma therapists and eight experts in computer science took part of the research. The VLO included four steps: i) planning, ii) construction of VLO and changes of content; iii) development of dynamic, and iv)

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conclusion and analysis. The VLO was inserted into the Moodle virtual learning environment. The ergonomic and pedagogical validation of the VLO was performed. **Results.** The experts appreciated the VLO satisfactorily, and scored it between good and full agreement. **Conclusion.** The VLO on intestinal elimination stoma is a tool that can be implemented at undergraduate programs in nursing and continuing education programs for nurses in clinical practice, contributing significantly to improve the theoretical skills necessary for the care of ostomized people safely, with quality and enabling self-care.

Key words: ostomy; distance education; educational technology; nursing.

Construcción y validación de un objeto virtual de aprendizaje sobre estomas intestinales de eliminación

Objetivo. Construir y validar un Objeto Virtual de Aprendizaje (OVA) sobre estomas intestinales. **Métodos.** Investigación aplicada, descriptiva y cuantitativa. En 2014 participaron ocho estomaterapeutas y ocho especialistas en informática. El OVA contempló cuatro etapas: i) planeación, ii) construcción del OVA y cambios de los contenidos, iii) desarrollo de la dinámica, y iv) conclusión y análisis. El OVA se añadió al ambiente virtual de aprendizaje *Moodle*. Se realizó la validación ergonómica y pedagógica del OVA. **Resultados.** Los especialistas apreciaron satisfactoriamente el OVA; de hecho, el acuerdo de expertos se puntuó entre la buena concordancia a la concordancia plena. **Conclusión.** El OVA sobre estomas intestinales es una herramienta que puede ser implementada en el Curso de Graduación de Enfermería y en los programas

de educación permanente para enfermeros en la práctica clínica, contribuyendo significativamente a mejorar la competencia teórica necesaria para el cuidado de personas estomizadas de forma segura, con calidad y posibilitando el autocuidado.

Palabras clave: estoma; educación a la distancia; tecnología educacional; enfermería.

Construção e validação de um objeto virtual de aprendizagem sobre estomas intestinais de eliminação

Objetivo. Construir e validar um objeto virtual de aprendizagem (OVA) sobre estomas intestinais de eliminação. **Métodos.** Pesquisa aplicada, descritiva e quantitativa. Em 2014 participaram oito Estomaterapeutas e oito especialistas em Informática. O OVA contemplou quatro etapas: i) planejamento, ii) construção do OVA e mudanças dos conteúdos; iii) desenvolvimento da dinâmica, e iv) conclusão e análise. O OVA foi inserido no ambiente virtual de aprendizagem *Moodle*. Realizou-se a validação ergonômica e pedagógica do OVA. **Resultados.** Os especialistas apreciaram satisfatoriamente o OVA, o acordo de especialistas pontuou-se entre a boa concordância a concordância plena. **Conclusão.** O OVA sobre estomas intestinais de eliminação é uma ferramenta que pode ser implementada no Curso de Graduação em Enfermagem e nos programas de educação permanente para enfermeiros na prática clínica, contribuindo significativamente a melhorar a competência teórica necessária para o cuidado de pessoas estomizadas de forma segura, com qualidade e possibilitando o autocuidado.

Palavras chave: estomia; educação a distância; tecnologia educacional; enfermagem.

Introduction

Increased life expectancy and the global population exposure to smoking, physical inactivity, unhealthy diet and alcohol contributed significantly to the increased risk of developing chronic noncommunicable diseases (CNCDs).¹ In Brazil, CNCDs are responsible for 72% of deaths, among which cancer (16.3%) stands out. Estimates point the occurrence of about 518,510 new cases of cancer, of which 14 180 will be colon and rectum cancers in men and 15 960 in women. These figures correspond to an estimated risk of 15 new cases per 100 thousand men and 16 per 100 thousand women. In the state of Piauí, northeastern region of Brazil, this estimate is 4.96 cases per 100 thousand men and 3.48 for every 100 thousand women, representing 33% and 21% of the national estimate, respectively.^{1,2}

Colorectal cancer is the most common cause for making stoma of intestinal elimination (colostomy or ileostomy), followed by trauma, inflammatory bowel disease, familial adenomatous polyposis and acute inflammatory processes such as diverticulitis.³ The intestinal ostomy (colostomy and ileostomy) resulting from surgical procedures that can be performed both in the large and small intestine consist in the manifestation of an intestinal segment through the abdominal wall, by creating an artificial opening called stoma for fecal and flatus output.⁴ In Brazil, about 33,864 people are ostomized and the Decree 400/09, which deals with health care of these clients, highlights the promotion of professional education on this subject in all health care levels to properly care for people with ostomy.^{4,5} In this context, nurses find people with intestinal stoma in their clinical practice, therefore, they should be able to care for these clients, strengthening their self-care and reintegration into society. However, studies show a lack of knowledge about stoma among nurses, mainly due to insufficient training on this subject at undergraduate level and the lack of continuing education programs after graduation.⁶⁻⁸

The literature highlights that Virtual Learning Objects (VLOs) are 'all kinds of media used in the

process of distance teaching and learning (videos, audios, forums, simulated environments, among others)⁹ as an effective strategy to support the teaching of undergraduates and nurses in clinical practice, and to increase customer engagement in self-care of the stoma.¹⁰⁻¹⁴ Internationally, many authors have reported the use of VLOs for educating customers, nursing students and nurses in clinical practice about stoma.^{8,13,15} There was no study in Brazil using VLOs to teach this subject, showing the need for researches of this nature. The conduction of studies supported by guidelines for the care and treatment of people with a stoma^{3,16,17} may increase the knowledge of nursing students and nurses of clinical practice on this subject, improve nursing care in the perioperative period of stoma, reduce early and late complications and encourage customer self-care. Furthermore, the dissemination of this knowledge through VLOs will make learning more autonomous and without geographical or temporal interferences. Given the exposed, the study question was the following: What was the evaluation of experts in Stomatherapy and Information Systems in relation to a virtual learning object on intestinal elimination stoma? To answer this question, this study aimed to construct and validate a virtual learning object on intestinal elimination stoma.

Methods

This is an applied, descriptive and quantitative study. It was conducted from December 2013 to February 2014, by the members of the Study Research and Extension Group in Stomatherapy and Technology (GEPEETEC - Grupo de Estudo Pesquisa e Extensão em Estomaterapia e Tecnologia) of a public university, and by the Distance Education Center (NEAD - Núcleo de Educação a Distância) of a private University, both located in the state of Piauí, Northeastern Brazil. In accordance with the National Health Council Resolution 466/2012, which deals with regulatory guidelines and rules of studies involving humans, this research was approved by an Ethics Committee (Protocol nº 17831113.4.0000.5214). For the construction and validation of the Virtual Learning

Object (VLO), were used the steps of Planning (Step 1); Construction/Change of contents (Step 2); Development of Dynamic (Step 3); and Conclusion and Analysis (Step 4).¹⁶

In Step 1, we defined the title; objectives; content; schedule; synchronous and asynchronous interaction instruments; method of evaluation and target audience. In Step 2, a webmaster from NEAD created the VLO that was hosted in the Moodle virtual learning environment (VLE). Afterwards, the nursing teachers and undergraduate and postgraduate students built the contents taking into consideration the international guidelines for the care and treatment of clients with a stoma.^{17,18} The contents were then inserted in the VLE, access tests were carried out, and the stomatherapy and information technology specialists who would validate the VLO were registered. In Step 3, the VLO was made available to the experts in stomatherapy and information technology. In Step 4, eight stomatherapy experts with at least a year of experience in the area, and eight information technology experts with at least graduation level performed ergonomic validations (adequacy of media integration, link operation, form of visualization and freedom to navigate). Given that stomatherapy experts were the only participants with content knowledge, they carried out the pedagogical validations (appropriateness of objectives and content offered to the target audience).

The experts received an invitation letter by e-mail to perform the validation. The Informed Consent form (IC), as well as the instrument of characterization and of ergonomic and pedagogical validation were adapted from literature.^{19,20} The ergonomic validation instrument included 23 items; 12 related to navigation, six to readability, four to media and one to printing. The pedagogical validation instrument included 19 items; 17 related to the content and two to the objectives. For each item, the expert should select an answer considering the following scale: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. The choice of values (1) and (2) should include justification. After giving the

consent by signing the IC, they were registered in the Moodle system, and received the user name and password to access the VLE by email. At the end of validation, participants should return the responded instrument via email to the researcher. The data obtained from validations were coded for the preparation of a data dictionary, then, transcribed with double entry using Microsoft Excel spreadsheets. After correcting errors, the data were exported and analyzed using the SPSS version 18.0. Descriptive statistics like frequencies, percentages, means and standard deviations were calculated.

Results

The virtual learning object

The VLO entitled intestinal elimination stoma was made available at the website: <http://ead.uninovafapi.edu.br>, and organized into seven units. Two units were introductory (to familiarize and present the following to the target audience: tutors, objectives, contents, schedule of activities, interactive tools and methods for evaluating the VLO). The other units dealt with the following contents: anatomy and physiology of the digestive system, conceptual aspects of elimination stoma, nursing care in the perioperative period of intestinal ostomy, early and late complications, ostomized people's rights, and procedure to change the ostomy appliance. All units had the same structure, namely: content, objectives, videos, instructional material, discussion forums and Hot Potatoes crossword exercises. Hot Potatoes is a free software that enables the creation of interactive exercises for the World Wide Web.

Validation of the VLO on intestinal elimination stoma

In total, 16 (100%) experts participated in the validation, of which eight were (50.0%) information technology specialists and eight (50.0%) stomatherapy specialists. Of all the sample, nine (56.3%) were male, aged between 25 and 61 years. Regarding academic titles, five (31.3%) had PhD, four (25.0%) had master's

degree, four (25.0%) had a specialization degree, and three (18.75%) had undergraduate degrees. The years of professional experience ranged 3-30

years. The ergonomic validation (Navigation, Readability, Media and Printing) of stomatherapy and IT experts is shown in Tables 1 and 2.

Table 1. Ergonomic validation of stomatherapy and information technology experts about navigation. Teresina, 2014

	Stomatherapy		IT	
	Mean	SD*	Mean	SD
Navigation				
1. Is navigation easy?	3.50	0.53	3.00	1.07
2. Is there a navigation map?	3.63	0.52	3.75	0.46
3. Are the buttons well defined and easily identified?	3.50	0.53	3.38	0.74
4. Is there freedom to move in and out of the pages?	3.63	0.52	3.50	0.76
5. Is there a scroll bar on the VLO homepage?	3.63	0.52	3.25	0.89
6. Are all links active and running?	3.50	0.75	3.38	0.74
7. Is there a menu bar?	3.63	0.52	3.13	0.99
8. Can the VLO be accessed by Internet <i>Explorer</i>	3.25	1.03	3.00	1.15
9. Can the VLO be accessed by Internet <i>Safari</i>	3.63	0.52	3.17	1.17
10. Can the VLO be accessed by Internet <i>Chrome</i>	3.38	1.06	3.57	0.53
11. Does the VLO take five seconds or less to load?	3.13	0.83	2.57	0.98
12. Is there a feedback mechanism with e-mail or contact phone?	3.63	0.52	3.00	1.00
Subtotal	3.50	0.59	3.22	0.68
Readability				
1. Are the colors appropriate?	3.75	0.46	3.38	0.52
2. Is the font size appropriate?	3.75	0.46	3.00	0.76
3. Is the font style appropriate?	3.75	0.46	3.50	0.53
4. Is the size of tables and charts appropriate?	3.62	0.52	3.13	0.83
5. Is the quality of text, tables and charts good?	3.62	0.52	3.25	0.71
6. Is the interface well designed?	3.62	0.52	2.88	0.83
Subtotal	3.69	0.46	3.19	0.54
Media				
1. Does the interface use resources of multimedia, animation, graphics and figures?	3.62	0.74	3.62	0.52
2. Is there media integration?	3.50	0.76	3.13	0.99
3. Are the presented figures in accordance with the text information?	3.50	0.76	3.38	0.52
Subtotal	3.54	0.75	3.38	0.68
Printing				
1. Does the VLO offer printing options?	3.50	0.76	3.00	0.93

* SD: – Standard deviation

In relation to navigation, most items evaluated by the stomatherapy and information technology experts obtained an average score higher than three (agree). However, an item validated by the IT experts had an average score below three (agree) – ‘The VLO takes five seconds or less to load’ 2:57 (s = 0.98). Regarding readability, all items validated by stomatherapy experts had positive agreement (average scores greater than three). There was disagreement (average score lower than three) by the IT experts in ‘Is the interface well designed?’ 2.88, and the others had average scores equal to or higher than three (agree). Media and printing

had average scores equal to or greater than three (agree) by both experts.

Table 2 shows the pedagogical validation (content and objectives). The 17 items related to the content obtained average equal to or higher than three (agree). With regard to objectives, there was positive agreement (higher than three mean) in the items. The total mean of navigation, readability, media, printing, content and objectives regarding the validation of experts in stomatherapy and IT were equal to or higher than three (agree). However, no item has been validated with full agreement (mean of four).

Table 2. Pedagogical validation of stomatherapy experts on the content and objectives. Teresina, 2014

	Mean	Standard deviation
Content		
1. It is consistent with the target audience?	3.50	0.76
2. Is the order in line with the proposed objectives?	3.50	0.53
3. Does it encourage various forms of learning?	3.63	0.52
4. Are sentences constructed with twenty words or less?	3.25	0.89
5. Are paragraphs constructed with five sentences or less?	3.13	0.83
6. Are acronyms used?	3.38	0.52
7. Are acronyms defined the first time they appear in the text?	3.38	0.52
8. Is the content reliable?	3.50	0.76
9. Is the source of information known?	3.63	0.52
10. Is it free from grammatical and typographical errors?	3.00	0.53
11. Is information updated?	3.38	0.74
12. Is there an author, editor or reviewer of the VLE?	3.25	0.71
13. Are the authors competent to address the content?	3.50	0.76
14. Is there a list of bibliographical references?	3.63	0.52
15. Is there an ‘About us’ session?	3.25	0.71
16. Does the VLO explicit its objectives or mission?	3.50	0.53
17. Does the content encourage student’s learning?	3.50	0.76
Subtotal	3.40	0.50
Objectives		
1. Are they consistent with the target audience?	3.50	0.76
2. Are they expressed in a language adapted to the target audience?	3.50	0.76
Subtotal	3.50	0.76

Discussion

Regarding ergonomics, significant findings in navigation related to the VLO loading time refer to probable technical problems during user access. Studies have shown that these problems compromise the satisfactory virtual learning, leading to frustration of students. Then, there is the need to review the resources and implemented tools to simplify the technical procedures and maximize the visibility and use of contents.^{3,20,21} Readability, media and printing are fundamental components for the presentation of the VLO - intestinal elimination stoma. Readability is desirable for this type of product according to the NBR 9241-11,²² however, IT experts suggested revising the interface used, because a well-designed interface provides easy and enjoyable interaction.²³ Media were rated with mean scores equal or higher than three by experts, promoting a dynamic and progressive interaction and reflection.²¹ The printing option may support learning by combining the printed material with the technology available online.

Regarding the pedagogical validation, the VLO content obtained mean scores higher than or equal to three (agree), reflecting consistency with the proposed objectives. Its reliability is recognized by pertinent and updated references. The lack of mean scores equal to four, full agreement, on validation items of the VLO - 'intestinal elimination stoma', reinforces the need for its constant improvement in order to include all the imposed requirements and satisfactorily achieve its objectives. A limitation of this study is the restricted number of evaluators, due to the unavailability of more professionals during the period stipulated for VLO validation. The sample of experts used herein has only reached the minimum required for the validation of digital products such as this, that is, eight experts in each area.²⁴ Also, the need for an IT support team to complete the steps in the proposed methodology was a limiting factor associated with the short time for production and validation. After changes suggested by the experts, the ergonomic and pedagogical validation enabled the implementation of the VLO in

undergraduate courses in nursing and continuing education programs for nurses in clinical practice. The construction, validation and implementation of the VLO 'intestinal elimination ostomy' can contribute significantly to the provision of nursing care for ostomized people in a safe and quality manner, allowing their self-care.

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