Validation of virtual learning object to support the teaching of nursing care systematization

Validação de objeto virtual de aprendizagem para apoio ao ensino da sistematização da assistência de enfermagem

Validación de objeto virtual de aprendizaje como apoyo a enseñanza de atención sistematizada de enfermería

Pétala Tuani Candido de Oliveira Salvador1, Camila Maria dos Santos MarizII, Allyne Fortes Vítor1, Marcos Antônio Ferreira Júnior1, Maria Isabel Domingues FernandesIII, José Carlos Amado MartinsIII, Viviane Euzébia Pereira SantosI

1Universidade Federal do Rio Grande do Norte, Postgraduate Program in Nursing. Natal, Rio Grande do Norte, Brazil.
II Universidade Federal do Rio Grande do Norte, Health Sciences Center, Department of Nursing. Natal, Rio Grande do Norte, Brazil.
III Escola Superior de Enfermagem de Coimbra, Scientific-Pedagogical Unit of Medical-Surgical Nursing. Coimbra, Portugal.

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ABSTRACT

Objective: to describe the content validation process of a Virtual Learning Object to support the teaching of nursing care systematization to nursing professionals. Method: methodological study, with quantitative approach, developed according to the methodological reference of Pasquali’s psychometry and conducted from March to July 2016, from two-stage Delphi procedure. Results: in the Delphi 1 stage, eight judges evaluated the Virtual Object; in Delphi 2 stage, seven judges evaluated it. The seven screens of the Virtual Object were analyzed as to the suitability of its contents. The Virtual Learning Object to support the teaching of nursing care systematization was considered valid in its content, with a Total Content Validity Coefficient of 0.96. Conclusion: it is expected that the Virtual Object can support the teaching of nursing care systematization in light of appropriate and effective pedagogical approaches.

Descriptors: Educational Technology; Teaching Materials; Validation Studies; Nursing Processes; Technical Education in Nursing.

RESUMO

Objetivo: descrever o processo de validação de conteúdo de um Objeto Virtual de Aprendizagem para apoio ao ensino da sistematização da assistência de enfermagem aos técnicos em enfermagem. Método: estudo metodológico, de abordagem quantitativa, desenvolvido segundo referencial metodológico da psicometria de Pasquali e realizado de março a julho de 2016, a partir de duas etapas Delphi. Resultados: na etapa Delphi 1, oito juízes avaliaram o Objeto Virtual; na etapa Delphi 2, sete. As sete telas do Objeto Virtual foram analisadas quanto à adequadabilidade de seu conteúdo. O Objeto Virtual de Aprendizagem para apoio ao ensino da sistematização da assistência de enfermagem foi considerado válido em seu conteúdo, com Coeficiente de Validade de Conteúdo total de 0.96. Conclusão: espera-se que o Objeto Virtual possa apoiar o ensino da sistematização da assistência de enfermagem à luz de abordagens pedagógicas adequadas e efetivas.

Descritores: Tecnologia Educacional; Materiais de Ensino; Estudos de Validação; Processos de Enfermagem; Educação Técnica em Enfermagem.

RESUMEN

Objetivo: describir el proceso de validación de contenido de un Objeto Virtual de Aprendizaje para apoyar la enseñanza de la sistematización de la atención de enfermería a técnicos en enfermería. Método: estudio metodológico, de abordaje cuantitativo, desarrollado según referencial metodológico de la psicometría de Pasquali, realizado de marzo a julio de 2016, a partir de dos etapas Delphi. Resultados: en la etapa Delphi 1, ocho jueces evaluaron el Objeto Virtual; en la etapa Delphi
INTRODUCCIÓN

Educacional tecnologías representan un conjunto de herramientas y aplicaciones que permiten la inclusión y fortalecimiento de nuevas estrategias de enseñanza, muchas de las cuales han sido definidas en nuevas estructuras curriculares en las dos últimas décadas.

En el panorama educativo, las tecnologías educativas se entienden como herramientas que necesitan ser incorporadas en sistemas educativos como respuesta a la demanda de enseñanza por la cual la tradicional enseñanza ya no es suficiente.

Por otro lado, los conclusiones del Consejo Europeo en la modernización de la educación incluyen el uso de la tecnología para promover el uso de enfoques centrados en el estudiante, la diversificación de métodos de enseñanza y el uso efectivo de tecnologías educativas, que son estrategias que son esenciales para consolidar un proceso de enseñanza-aprendizaje activo y cooperativo.

En este contexto, el uso de la tecnología sin embargo, no está considerado como una herramienta educativa (8). Esto significa que el uso de tecnologías educativas debe ser un enfoque pedagógico adecuado y efectivo.

La validación del contenido es un proceso que se realiza para verificar la relevancia del contenido, y en este caso, se propuso validar el diseño de uno de estos objetos virtuales para el apoyo a la enseñanza de la sistematización de la atención de enfermería.

OBJETIVO

La hipótesis a proponer en este caso es que el contenido del objeto virtual propuesto es válido para apoyar la enseñanza de la sistematización de la atención de enfermería.

MÉTODO

Aspectos éticos

Los principios éticos establecidos por la Resolución nº 466/2012 del Consejo Nacional de Salud fueron seguidos. La propuesta de la investigación fue aprobada por el Comité de Ética en la Investigación.

Diseño, localización y periodo

La investigación es un estudio metodológico, con enfoque cuantitativo, desarrollado a partir de un marco metodológico adaptado de la psicometría de Pasquali et al. (12). Debe tener en cuenta que la validación del contenido se realiza para verificar la relevancia de los ítems para el constructo que representan, que debe ser efectivo y que se debe evaluar de acuerdo con la validación de jueces expertos.

El periodo de evaluación del objeto virtual se realizó desde marzo a julio de 2016, a través de un Delphi de dos etapas. El objeto virtual consta de siete pantallas: pantalla inicial; pantalla de validación; pantalla de revisión; pantalla de presentación; pantalla de créditos; y cuatro páginas de contenido (Chart 1).
## Chart 1 – Screens that compose the Virtual Learning Object to support the teaching of Nursing Care Systematization to nursing professionals

<table>
<thead>
<tr>
<th>Screen</th>
<th>Objective</th>
<th>Composing Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial screen</td>
<td>Present the Virtual Object with navigation instructions</td>
<td>Initial text with welcome Navigation Instructions Conceptual map with schematization of the concepts and access buttons to content screens</td>
</tr>
<tr>
<td>Presentation screen</td>
<td>Provide information on the development and composition of the Virtual Object</td>
<td>Initial text with presentation of the thesis project of the Virtual Object development and validation Information about the target audience, objective and contents of the Virtual Object</td>
</tr>
<tr>
<td>Credits screen</td>
<td>Present institutions and team responsible for the development of the Virtual Object</td>
<td>Information from production and financing institutions and development team</td>
</tr>
<tr>
<td>Content screen 1 Nursing Care Systematization: concept and benefit</td>
<td>Learning objective: To understand the concept and importance of Nursing Care Systematization (SAE)</td>
<td>Title Learning Objective Interactive text with hyperlinks Synthesis of concepts Reading tips Proposal of the activity</td>
</tr>
<tr>
<td>Content screen 2 Ethical-legal aspects of Nursing Care Systematization</td>
<td>Learning objective: To identify the historical and ethical-legal aspects that involve SAE</td>
<td>Title Learning Objective Interactive text with hyperlinks Synthesis of concepts Reading tips Proposal of the activity</td>
</tr>
<tr>
<td>Content screen 3 Operationalization of Nursing Care Systematization</td>
<td>Learning objective: To understand the difference between the concepts of SAE and the Nursing Process</td>
<td>Title Learning Objective Interactive text with hyperlinks Synthesis of concepts Reading tips Proposal of the activity</td>
</tr>
<tr>
<td>Content screen 4 Nursing Process: stages and integration of nursing professional</td>
<td>Learning objective: To perceive the phases of the Nursing Process and the importance of nursing professional participation in SAE</td>
<td>Title Learning Objective Interactive text with hyperlinks Synthesis of concepts Reading tips Proposal of the activity</td>
</tr>
</tbody>
</table>

Note: SAE – Sistematização da Assistência de Enfermagem (Nursing Care Systematization)

## Chart 2 – Adaptation of the expert punctuation system of Fehring’s content validation model[13]

<table>
<thead>
<tr>
<th>Fehring criteria (1994)</th>
<th>Points</th>
<th>Adapted criteria</th>
<th>Adapted points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s in nursing</td>
<td>4</td>
<td>Master’s in Nursing (Criteria required)</td>
<td>0</td>
</tr>
<tr>
<td>Master’s in nursing – Dissertation with relevant contents of the clinical area</td>
<td>1</td>
<td>Master’s with dissertation on SAE</td>
<td>2</td>
</tr>
<tr>
<td>Research (with publication) in the diagnostics area</td>
<td>2</td>
<td>Research in the SAE area</td>
<td>3</td>
</tr>
<tr>
<td>Article published in the area of diagnostics in an influential journal</td>
<td>2</td>
<td>Article published in the SAE area in an influential journal</td>
<td>2</td>
</tr>
<tr>
<td>PhD in diagnosis</td>
<td>2</td>
<td>PhD with dissertation on SAE</td>
<td>4</td>
</tr>
<tr>
<td>Clinical practice of at least one year in the area of nursing in a clinic</td>
<td>1</td>
<td>Experience as teacher of Technical Nursing Course of at least six months</td>
<td>2</td>
</tr>
<tr>
<td>Certificate in clinical medical area with proven clinical practice</td>
<td>2</td>
<td>Certificate of specialization in the area of technical education</td>
<td>1</td>
</tr>
<tr>
<td>Maximum score</td>
<td>14</td>
<td>Maximum score</td>
<td>14</td>
</tr>
</tbody>
</table>

Note: SAE – Sistematização da Assistência de Enfermagem (Nursing Care Systematization)

## Population and sample

Judges were selected through the analysis of their curricula submitted to the Lattes Platform to participate in the validation process of the Virtual Object. The following search strategy was used in this database: Search mode (subject [title or production keyword]) – Nursing Care Systematization; in the bases – PhDs and other researchers; Education/Degree – Master’s; And Professional background: General Area – Health Sciences/Area – Nursing.

In order to select the judges, the curricula were analyzed according to Fehring criteria[13], with a minimum score of five points for the selection of experts in the construct area (Chart 2). Next, the authors sought the e-mail of the selected judges from their own curricula, from institutions’ websites in which they worked or from published articles.

However, for studies based on the Delphi technique, sampling is not predictable and there is no ideal number of participants[12]. However, theoretical frameworks of instrument validation procedures suggest a number from six to twenty judges[2].

Thus, based on the criteria that at least six judges are required to compose the content validation stage[12], 40 experts were pre-selected because of the significant number of losses due to the non-response of the judges – an aspect that was already reported in other studies, indicating response rates for electronic questionnaires around 15%[14,16].

## Research protocol

For the 40 experts selected, the authors sent an invitation e-mail with the presentation of the research and its objectives and the Informed Consent Form (TCLE). In this first stage, 14 judges accepted to participate in the study. The TCLE was sent as a mechanism to guarantee the ethical precepts of the research.
Validation of virtual learning object to support the teaching of nursing care systematization

Eleven judges sent the signed TCLE. An e-mail with instructions for the process of evaluation of the Virtual Learning Object was sent to them. In the Delphi 1 stage, eight judges evaluated the Virtual Object; in Delphi 2, seven judges filled out the evaluation tool.

The data collection instrument was built using the electronic tool Google Docs, and it consists of three pages: 1) characterization of the judges, with guarantee of their anonymity; 2) analysis of the pertinence of the content of each screen of the Virtual Object, with the evaluation of the items according to the options Adequate, Partially Adequate or Inadequate, with open space for "comments or suggestions for inadequacies"; and 3) evaluation of the Virtual Object as a whole, according to Pasquali’s criteria10.

Analysis of results and statistics

Data were analyzed with descriptive statistics, using absolute and relative frequencies. The item with more than 80% agreement between the judges (rated as Adequate) and a Content Validity Coefficient (CVC) > 0.813 was considered valid.

RESULTS

Eight judges participated in the final sample, with predominance of women (7, 87.5%); with the mean age of 48.8 ± 12.7 years; and with a PhD degree (5; 62.5%). All the evaluators had experience in teaching, with a mean time of 14.0 ± 12.7 years, in the following academic levels: technical education (4; 50.0%); undergraduate (6; 75.0%); and graduate (6; 75.0%). The judges taught on more than one academic level simultaneously; seven (87.5%) of them had experience in care, with a mean of 12.1 ± 8.2 years.

Table 1 shows the result of the evaluation of the Virtual Learning Object screens in Delphi 1 and 2 stages.

In the first evaluation stage, only the Credits Screen was considered valid in its content, with judges agreeing on the appropriateness of the item = 87.5% and CVC = 0.96. Therefore, the experts’ suggestions for all screens were evaluated for their suitability. The Virtual Object has been modified in order to improve its content according to the judges’ suggestions. Chart 3 shows the changes made after the Delphi 1 stage.

The modified Virtual Learning Object was submitted to the new evaluation stage (Delphi 2). From this evaluation round, all screens were considered valid in their content, with judges agreeing on adequacy greater than 80% and CVC > 0.8 (Table 1).

Regarding the evaluation of the content validation criteria of the Virtual Object as a whole, Table 2 presents the results obtained in Delphi 1 and 2 stages.

It is understood that, after the adjustments made from the Delphi 1 stage, the Virtual Learning Object to support the teaching of nursing care systematization was considered valid in its content, with a total CVC of 0.96.
Chart 3 – Judges’ suggestions on items considered partially adequate and inadequate in Delphi 1 stage, Natal, Rio Grande do Norte, Brazil, 2016

<table>
<thead>
<tr>
<th>Item</th>
<th>Modified aspects</th>
<th>Non-modified aspects/ Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial screen</strong></td>
<td>Modifications/corrections of the text: to be initiated with welcome; the navigation guidelines and presentation of the conceptual map were improved; grammatical corrections were performed; Modifications/corrections in the image of the conceptual map: step 5 of the Nursing Process was included; the buttons that present the content pages were differentiated by colors to facilitate oriented navigation in the VLO; The UFRN logo was modified.</td>
<td>The letter size was not increased, but it is suggested that the user works with zoom, which allows this functionality.</td>
</tr>
<tr>
<td><strong>Presentation screen</strong></td>
<td>Presentation: the information that it is suggested to use the VLO in the blended learning teaching mode was included; Objective: it was modified for general purpose and the specific objectives for each page of content were transposed; Contents: the contents that compose the VLO were highlighted; Item “Reflect upon this to learn more”: it was emphasized that the suggestions of activities are not summative evaluations, but rather stimuli to learning; Grammatical corrections were performed.</td>
<td>The letter size was not increased, but it is suggested that the user works with zoom, which allows this functionality.</td>
</tr>
<tr>
<td><strong>Credits screen</strong></td>
<td>The UFRN logo was modified; The authors’ training background was added.</td>
<td>Nothing to declare</td>
</tr>
<tr>
<td><strong>Content screen 1</strong></td>
<td>The learning objective was added; Content: content optimization was conducted, with reduced presented information and increased text dynamity; Item “Reflect upon this to learn more”: tools for infographic construction were reduced and video tutorials added in Portuguese; Grammatical corrections were performed; An image (post-it) with a summary of what was presented on the page was added at the end of the content; Bibliographic references have been reallocated to the bottom of the page and links to online access have been added; Design: The background color matches the Home Page button, and a top navigation bar was added in the VLO.</td>
<td>Nothing to declare</td>
</tr>
<tr>
<td><strong>Content screen 2</strong></td>
<td>The learning objective was added; Content: content optimization was conducted, with the reduction of presented information and the increase in the dynamicity of the text, besides highlighting the contribution of ABEn in the process of struggle for SAE; Item “Reflect upon this to learn more”: the tools of construction of HQ were replaced by one in Portuguese and the video tutorial was added in Portuguese; Grammatical corrections were performed; An image (post-it) with a summary of what was presented on the page was added at the end of the content; Bibliographic references have been reallocated to the bottom of the page and links to online access have been added; Design: background color matches Home Page's conceptual map button and a top navigation bar was added in the VLO.</td>
<td>The historical course was maintained with reductions only in content and increased dynamism of the text, as it is aimed, in this page, that the student understands how the legislations referring to SAE have evolved in the course of history.</td>
</tr>
<tr>
<td><strong>Content screen 3</strong></td>
<td>The learning objective was added; Content: content optimization was conducted, with reduced presented information and increased text dynamity; Item “Reflect upon this to learn more”: reduced tools to construct word clouds and tutorial videos were added in Portuguese; Grammatical corrections were performed; An image (post-it) with a summary of what was presented on the page was added at the end of the content; Bibliographic references have been reallocated to the bottom of the page and links to online access was added; Design: background color matches Home Page’s conceptual map button and a top navigation bar was added in the VLO.</td>
<td>The discussion about the differences between SAE and the Nursing Process was maintained, with due references to the literature that presents this distinction. The authors’ understanding that the confusion the use of terms without distinction may be an element capable of constituting an obstacle to the consolidation of SAE, insofar as the professionals do not understand it in its essence.</td>
</tr>
</tbody>
</table>

To be continued
Validation of virtual learning object to support the teaching of nursing care systematization

Salvador PTCO, et al.

The learning objective was added; Content: content optimization was conducted, with reduced presented information and increased text dynamicity; Item "Reflect upon this to learn more": tools for infographic construction were reduced and video tutorials added in Portuguese; Grammatical corrections were performed; An image (post-it) with a summary of what was presented on the page was added at the end of the content; Bibliographic references have been reallocated to the bottom of the page and links to online access was added; Design: background color matches Home Page's conceptual map button and a top navigation bar was added in the VLO.

Nothing to declare

Table 2 – General evaluation of the judges about the Virtual Learning Object in the Delphi 1 and Delphi 2 stages (n = 8 in the Delphi 1 Stage and n = 7 in the Delphi 2 Stage), Natal, Rio Grande do Norte, Brazil, 2016

<table>
<thead>
<tr>
<th>Item</th>
<th>Modified aspects</th>
<th>Non-modified aspects/Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Item screen 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The learning objective was added;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Content: content optimization was conducted, with reduced presented information and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>increased text dynamicity; Item &quot;Reflect upon this to learn more&quot;: tools for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>infographic construction were reduced and video tutorials added in Portuguese;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grammatical corrections were performed;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>An image (post-it) with a summary of what was presented on the page was added at</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the end of the content; Bibliographic references have been reallocated to the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bottom of the page and links to online access was added;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design: background color matches Home Page’s conceptual map button and a top</td>
<td></td>
</tr>
<tr>
<td></td>
<td>navigation bar was added in the VLO.</td>
<td></td>
</tr>
</tbody>
</table>

Note: VLO – Virtual Learning Object; UFRN – Universidade Federal do Rio Grande do Norte (Federal University of Rio Grande do Norte); SAE – Sistematização da Assis- tência de Enfermagem (Nursing Care Systematization); ABEn – Associação Brasileira de Enfermagem (Brazilian Nursing Association); HQ – História em Quadrinhos (Comics)
DISCUSSION

From the two Delphi stages, all screens of the Virtual Object were considered valid in their content, with judges agreeing on adequacy greater than 80% and CVC > 0.8, corroborating the methodological reference of the psychometry used.

The content validation of educational technologies constitutes a fundamental stage, with the purpose of verifying the relevance of the teaching material components to the construct they represent.

Among the validation methods, the Delphi technique is highlighted in the literature because it allows consulting a group of judges who are experts in the subject of the material. Unlike other research strategies, its objective is not to deduce a simple answer or to reach a consensus only, but to obtain quality answers and opinions for a given question presented to a panel of experts.

In this study, the authors highlight the significant experience of the judges participating in the validation stages, who had much experience in teaching and nursing care, on different academic levels of nursing.

It is considered that the analysis of the experts was fundamental to obtain a valid Virtual Learning Object in its content. The improvements suggested in the Delphi 1 stage guided the improvement of the Virtual Object, especially related to the dynamism required for the content proposed in an educational technology, for the conciseness and clarity of digital texts are decisive elements for a pleasant and meaningful learning.

The dissemination of the use of educational technologies is stimulated by its innumerable advantages, which include offering students an easy understanding of the subject studied, considering individual rhythm and active learning. However, while these advantages are recognized, educational technologies need to be evaluated to ensure their quality.

Therefore, it is valid to highlight the pedagogical base in light of which the Virtual Object was developed, an essential element for the incorporation of educational technology in the teaching/learning environments. Thus, it reinforces the idea that although many advantages are associated with educational technologies mediated by computers or similar devices, the use of information technology in the educational system should be a complementary tool that helps, but never replaces, teachers.

In this perspective, the use of the presented Virtual Object is encouraged by the concept of the blended learning and the flipped classroom. Both are pedagogical approaches that represent not only a combination of online and offline teaching methods, but also a combination of learning theories with the proposal of self-directed and flexible activities, translated into incentives for active learning, in an integration of in-person and distance activities.

Teachers should take on new and different approaches in order to promote collaborative learning, a space in which the Virtual Learning Object presents itself as an enriching didactic strategy. Thus, an on-site space becomes a dynamic environment of reflections and discussions, based on distance learning, with the support of the Virtual Object.

The necessary teaching preparation for the integration of the Virtual Object in the teaching/learning spaces is indicated, based on a fundamental pedagogical approach.

The Technological Pedagogical Content Knowledge Model (TPACK) outstands among the theoretical frameworks to provide support on how a technology should be properly integrated in the classroom. TPACK describes the necessary connection of three areas of knowledge to the work with educational technologies: curricular, pedagogical and technical.

In this sense, the curriculum needs to be understood, with the definition of the subject or with the content for the technological implementation, and this includes tracing the objectives to be achieved. The pedagogical component should ensure that the development of technology takes place in light of learning theories, with faculty support, while the technical aspect comprises the necessary training for the use of technological resources, selection criteria and proposed uses for technology, which involves not only the teachers, but all components of the educational institution.

The process of developing and validating educational technologies is a fundamental and complex step that requires an appropriate pedagogical and technical approach, as without it one risks to produce technological material that is free of effective educational objectives. Research corroborates this assertion by pointing out that the success of an educational technology is directly related to its adequate development process.

A study conducted in Taiwan aimed at establishing a comprehensive and multidimensional model to evaluate the success of blog-based learning systems, pointed out the relationship between six success variables: system quality, content quality, educational context, users' satisfaction, system usage, and user performance. Specifically, this study confirms that the quality attributes of educational technology positively affect user satisfaction, influencing performance and learning.

From another perspective, a research conducted in Spain, with the objective of formulating a theoretical model to identify the factors associated with the welfare of teachers, when faced with innovative educational processes mediated by the use of educational technologies, denoted the influence of three axes for the motivation of teachers.

The first axis consists of projects and values of the teachers themselves, while the second refers to the favorable conditions for innovation to be successful, which involves both the teachers' skills and the mood and culture of the educational institution. In turn, the third axis has a personal and subjective character, as it encompasses an emotional effect of the use of educational technologies, it produces satisfaction and emotions that finally lead the teachers to well-being.

It is evident from this research that the incorporation of educational technologies in educational environments involves two primary aspects: on one hand, a process of development and validation of educational material with adequate technical, pedagogical and methodological input, and, on the other hand, the incorporation of validated educational technology with a necessary preparation on behalf of the teachers and the teaching institution as a whole. Thus, the validation of an
educational technology should be a frequent and continuous process, due to the constant innovations and technological improvements experienced. 

As a limitation of the study, in contrast, the low number of responses of the experts outstands. However, it is noteworthy that the sample of judges was constituted of number considered adequate by the methodological reference used.

It also highlights the subjectivity of the options for evaluating the content of the Virtual Object – Adequate, Partially Adequate and Inadequate – as a limiting aspect of the study. The methodological framework used suggests an agreement of more than 80% to consider an item valid, which does not specify whether, for this accounting, only the assessments determined as Adequate in their fullness should be considered.

In addition, judges’ evaluation of a Partially Adequate item consisted of a clearly subjective process, with notes of inadequacies that did not influence the content of the Virtual Object, the focus of the analysis in our study.

In order to make this evaluation process more objective, the item that presented more than 80% agreement between the judges (evaluated as Adequate) and a Content Validity Coefficient (CVC) > 0.8 was considered valid. This last method of analysis allows a clear and cohesive evaluation.

The authors hope that the valid Virtual Object in its content can support the teaching of nursing care systematization to nursing technicians in light of adequate and effective pedagogical approaches.

CONCLUSION

The hypothesis of this study was confirmed: the content of the proposed Virtual Learning Object is valid to support the teaching of nursing care systematization to nursing technicians.

As the next stage of the study, the need to validate the appearance and usability of the Virtual Object with the public for which it is intended, the students, is emphasized.

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REFERENCES


