








## Criteria for selecting experts in the evaluation of educational technologies in Nursing: an integrative review

### Cr terios de sele o de experts na avalia o de tecnologias educacionais na Enfermagem: revis o integrativa

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#### ABSTRACT

**Objective:** to analyze the criteria for selecting experts in studies evaluating the validity of educational technologies in nursing. **Methods:** an integrative review was carried out in five databases. Full publications from the last five years in Portuguese, English, and Spanish were included. The analysis was carried out by two independent researchers, with the help of a third reviewer. **Results:** 29 studies were included. The majority chose to adopt criteria drawn up by the authors themselves (n=18; 62.1%); followed by using other methodological references (n=7; 24.1%); and the original Fehring or with adaptations (n=4; 13.8%). The criteria analyzed referred to the domains of academic training, professional performance/experience, and productions. **Conclusion:** most of the studies did not cite a reference to determine the criteria for selecting experts, nor did they establish a minimum score for selecting experts. **Contributions to practice:** the need for standardization in the selection of experts and the development of new, comprehensive, and up-to-date criteria such as the one proposed is essential to guide researchers and health professionals in the selection of experts for the evaluation of educational technologies in the field of nursing.

**Descriptors:** Evaluation Study; Educational Technology; Nursing.

#### RESUMO

**Objetivo:** analisar os cr terios para sele o de *experts* nos estudos de avalia o da validade de tecnologias educativas na enfermagem. **M todos:** revis o integrativa realizada em cinco bases de dados. Foram inclu das publica es na  ntegra, dos  ltimos cinco anos, em portugu s, ingl s e espanhol. A an lise foi realizada por dois pesquisadores independentes, com aux lio de um terceiro revisor. **Resultados:** foram inclu dos 29 estudos. A maioria optou por adotar cr terios elaborados pelos pr prios autores (n=18; 62,1%); seguido por utilizar outros referenciais metodol gicos (n=7; 24,1%); e por Fehring original ou com adapta es (n=4; 13,8%). Os cr terios analisados se referiam aos dom nios de forma o acad mica, atua o/experi ncia profissional e produ es. **Conclus o:** verificou-se que a maioria dos estudos n o citou um referencial para determinar os cr terios de sele o dos *experts* e nem estabeleceu pontua o m nima para a sele o dos *experts*. **Contribui es para a pr tica:** evidenciou-se a necessidade de uma padroniza o para a sele o de *experts* e a elabora o de cr terios novos, abrangentes e atualizados como o proposto   fundamental para orientar os pesquisadores e profissionais de sa de na sele o de *experts* para a avalia o de tecnologias educativas na  rea da enfermagem.

**Descritores:** Estudo de Avalia o; Tecnologia Educacional; Enfermagem.

## Introduction

Educational technologies are learning tools capable of expanding the knowledge, skills, and actions needed to carry out health education practices. In this context, the development of this type of technology by nurses has increased significantly in recent decades, especially for health promotion and to promote the training of health professionals<sup>(1)</sup>.

Considering the technological advances and the benefits that educational technologies can bring to the care process in different nursing contexts, we can see the development of various resources such as videos, manuals, websites, printed materials, booklets, games, software or applications, virtual learning environments, simulators, audio or podcasts, toys, comic books, among others, which address different themes and audiences<sup>(1)</sup>.

In addition to developing technologies that are attractive and appropriate for the target audience, it is recommended that they undergo a process of evaluation of the evidence of validity with experts to ensure the information contained in the material as well as its quality.

It should also be noted that there is no consensus on the use of the term validation in the literature, and it is perceived to be more appropriate for the process of developing measuring instruments, such as psychometric scales. However, most nursing publications have used this term, including in the process of evaluating or analyzing evidence of validity (of content, appearance, and technical aspects) in the context of educational technologies for health.

Therefore, during the technology development process, one of the fundamental stages is to evaluate the tools with experts before they are applied to the population, to ensure that they are safe to use and that the technology produced fulfills its purpose. Experts make an important contribution to the consistency of processes for assessing evidence of the validity of technologies. This professional is defined as someone with reliable knowledge and skills in a specific area<sup>(2)</sup>.

Considering this, the criteria for selecting experts must consider their mastery of the subject, whether through their academic training, professional experience, or productions in the area.

However, despite the obvious relevance of technology assessment in the nursing field, there are differences in the literature regarding the selection of experts.

Both Fehring's criteria, specifically aimed at standardizing the validation of nursing diagnoses<sup>(3)</sup>, and Jasper's criteria, which establish a set of requirements for defining experts, whether they are teachers, caregivers, or technicians<sup>(4)</sup>, are used.

The definitions of expert or expertise show a diversity of criteria used to select these subjects, such as professional activity, level of educational training, length of experience, as well as identification by peers<sup>(5)</sup>.

Considering the above, there is a need to join the criteria for selecting experts used by researchers in the field of nursing in the context of educational technologies, so that it is possible to propose new criteria for considering a professional as an expert. This study therefore aims to analyze the criteria for selecting experts in studies evaluating the validity of educational technologies in nursing.

## Methods

This is an integrative review, conducted according to the following steps: 1) Elaboration of the guiding question; 2) Search and selection of primary studies; 3) Extraction of data from studies; 4) Critical evaluation of the primary studies included in the review; 5) Synthesis of the review results; and 6) Presentation of the review<sup>(6)</sup>.

The formulation of the research question was guided by the PCC mnemonic strategy (Population (P): experts; Concept (C): criteria adopted for selecting experts; and Context (C): evaluation of evidence of the validity of educational technologies in nursing). Therefore, the guiding question of this study was:

What criteria are used to select experts in the process of evaluating evidence of the validity of educational technologies in nursing?

The search strategy used the descriptors “Validation Study,” “Technology,” and “Nursing,” indexed in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH). These were combined using the Boolean operator AND. It should be noted that the term validation was chosen in this study because almost all the studies from the last five years have used the term validation in their descriptors instead of evaluation when it comes to assessing or analyzing evidence of validity.

The eligibility criteria were full scientific publications from the last five years that addressed the evaluation of educational technologies in nursing with the selection criteria of experts in Portuguese, English, and Spanish. Editorials, letters to the editor, event proceedings, reports, case studies, experience reports, and reviews were excluded.

The search for studies was carried out in October 2023 in the following databases: Latin American and Caribbean Health Sciences Literature (LILACS) via the Virtual Health Library (VHL), Medical Literature Analysis and Retrieval System Online (MEDLINE) via PubMed, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and SCOPUS. The databases were accessed through the Federated Academic Community (CAFe), which belongs to the journal portal of the Coordination for the Improvement of Higher Education Personnel (CAPES).

The results obtained from the databases were exported to Rayyan® software to remove duplicates and select and screen the studies independently by two researchers, with any discrepancies being resolved by a third reviewer. Initially, titles and abstracts were read, and studies that met the inclusion criteria were then analyzed in full. The selection was structured according to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA)<sup>(7)</sup>.

The data extracted included authors, country

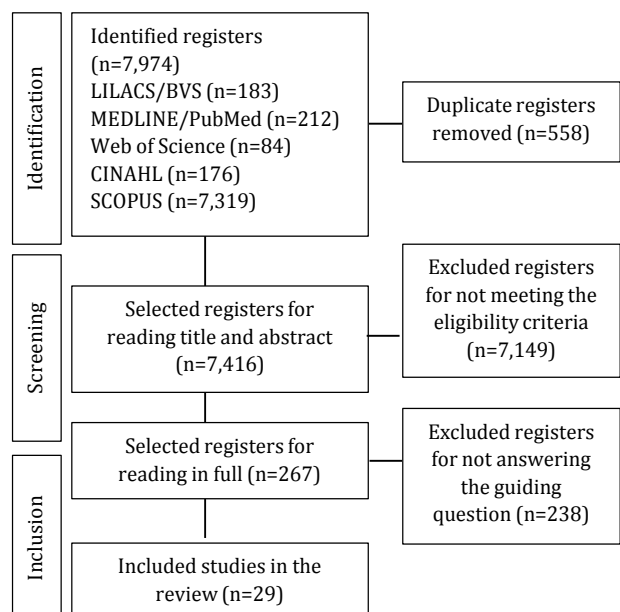
where the research was carried out, year of publication, title of the scientific journal, type of technology developed and validated, and criteria used in the studies to be considered an expert.

The information extracted was then analyzed and summarized descriptively, in a single category, and presented in tables, to bring together the findings on the subject under investigation and discuss them because of the available literature.

Ethical aspects regarding the citation of authorship were strictly followed. As the material is public and available for open access, the Research Ethics Committee did not need to review it.

## Results

The search resulted in 7,974 scientific publications. After removing duplicate studies, 7,416 studies remained eligible for the title and abstract analysis stage; of this total, 267 were selected to be read in full. Figure 1 shows the detailed selection process and the results obtained. The final sample consisted of 29 studies that met the eligibility criteria.



**Figure 1** – Flowchart for selecting articles, adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analysis. Redenção, CE, Brazil, 2023

All the studies were published between 2018 and 2020, with the majority of them corresponding to 2019 (n=13; 44.8%) and developed in Brazil, with these studies being conducted mainly in the Northeast region (n=14; 48.3%).

The types of educational technology that predominated in the studies on constructing and evaluating evidence of validity were booklets (n = 11; 37.9%), followed by technologies in video format (n=3; 10.3%), and educational manuals (n = 2; 6.9%). Most of the studies analyzed did not use a reference to determine the criteria for selecting experts, opting to adopt criteria drawn up by the authors themselves

(n = 18; 62.1%), followed by studies that opted for other methodological references (n = 7; 24.1%); and some opted for Fehring (original or with adaptations) (n = 4; 13.8%) (Figure 2).

We identified that most of the authors of the studies analyzed did not establish a minimum score for selecting experts (n = 17; 58.6%). However, for the 12 (41.4%) studies that did classify points, the minimum score for content experts was five points (n = 9; 75%). For technical experts, only seven studies presented a points' classification, with the minimum score of three points being the most prevalent (n = 5; 71.4%) (Figure 2).

Authors	Country/ year	Educational technology developed	Journal	Used criteria to be considered an expert
Brasil GB et al <sup>(6)</sup>	Brazil/2018	Booklet	Rev Bras Enferm	Criteria drawn up by the authors themselves - Content experts: Health professionals, specialists or not, who have been working in the field* for at least five years.
Saraiva NCG et al <sup>(9)</sup>	Brazil/2018	Series album	Rev Latino-Am Enfermagem	Criteria drawn up by the authors themselves - Experts in the content: Have at least a master's degree; have published at least once around developing and validating educational technologies and/or in the field*; have worked for at least one year in this area*.
Pinheiro DGM et al <sup>(10)</sup>	Brazil/2018	Program	Cogitare Enferm	Criteria drawn up by the authors themselves - Experts in the content: Theoretical and practical mastery for nurses; expertise in the area*; specialization in the area*.
Alvarez AG et al <sup>(11)</sup>	Brazil/2018	Application	Nurse Educ Today	Criteria drawn up by the authors themselves - Experts in the content: Nurse teachers who have worked in an undergraduate course in a subject related to the area*; with at least two years' experience; and with specialization, master's or doctoral certification.
Pinto TRC et al <sup>(12)</sup>	Brazil/2018	Cartoon	Rev Bras Enferm	Criteria elaborated by the authors themselves - Experts in the content: Health professionals working in the Neonatal Intensive Care Unit with at least two years of clinical experience in the area* or with a specialization, residency, master's, or doctoral degree.
Salvador PTCO et al <sup>(13)</sup>	Brazil/2018	Virtual learning object	Rev Bras Enferm	Fehring adapted - Experts in the content: Master's degree in nursing; dissertation in the area*; research in the area*; article published in the area in a reference journal; PhD with thesis in the area*; teaching experience in a technical course (minimum of six months); specialization around technical teaching.
Oliveira LL et al <sup>(14)</sup>	Brazil/2019	Educational hypermedia in the form of a website	Rev Bras Enferm	Criteria adapted from Barbosa <sup>(15)</sup> and Freitas et al <sup>(16)</sup> - Content experts: doctorate or master's degree; thesis or dissertation in the subject area; specialization/residency; monograph; participation in a research group; publication of articles; teaching experience without time limits; practical work in the area; supervision of work in the subject area; and participation on an evaluation board. Experts in the technical area: Technology area: thesis or dissertation around educational technology; doctorate or master's degree in computer science; scientific production around distance education; professional experience without time limits; specialization around website development.
Alves MG et al <sup>(17)</sup>	Brazil/2019	Video lesson	Rev Gaúcha Enferm	Fehring - Content experts: Master's degree in nursing; dissertation in the field*; research published in the field*; article published in the field in a leading journal; doctorate in nursing with thesis in the field*; recent clinical practice of at least one year; training (specialization) in the field.
Vale JMM et al <sup>(18)</sup>	Brazil/2019	Booklet	Rev Rene	Fehring adapted - Content experts: At least two years of experience in the area*; degree; scientific production; participation in events.
Silva CSG et al <sup>(19)</sup>	Brazil/2019	Booklet	Rev Cuidarte	Criteria drawn up by the authors themselves - Content experts: Professionals involved in management, teaching, research, and assistance in the area* with at least one year's experience.
Perdigão MMM et al <sup>(20)</sup>	Brazil/2019	Folder	Rev Bras Enferm	Jasper - Experts (researchers/doctors; assistants; in the technical field): Requirements: have skill and knowledge acquired through experience; have skill in the type of study; have passed a specific test to identify judges; have a high rating from an authority.
Cherubim DO et al <sup>(21)</sup>	Brazil/2019	Musical educational technology	Rev Bras Enferm	Fehring adapted - Experts in the content: Master's degree in nursing; dissertation in the field*; research published in the field*; article published in the field in a reference journal; doctorate in nursing with a thesis in the field*; the recent clinical practice of at least one year; training (specialization) in the field.
Rosa BVC et al <sup>(22)</sup>	Brazil/2019	Video	Texto Contexto Enferm	Criteria drawn up by the authors themselves - Content experts: Expertise related to the field of health in the thematic area of the study. Experts in the technical area: Know in the field of social communication.

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Santiago JCS et al <sup>(23)</sup>	Brazil/2019	Booklet	Rev Bras Enferm	Joventino et al <sup>(24)</sup> - Content experts (teaching researchers): Professors with academic production, publications, participation in research groups, on examination boards, teaching experience, clinical experience, and guidance in the area*. Content experts (assistants): Academic production, publications, participation in research groups, on examination boards, teaching experience, clinical experience, and guidance in the area*. Experts in the technical field: same criteria as above but considering design and/or marketing.
Galindo Neto NM et al <sup>(25)</sup>	Brazil/2019	Video	Rev Latino-Am Enfermagem	Criteria drawn up by the authors themselves - Content experts: Nurses with experience of care in the area* and teaching or research experience in the area*.
Barbosa CP et al <sup>(26)</sup>	Brazil/2019	Software	J Pediatr (Rio J)	Criteria adapted from Freitas et al <sup>(16)</sup> - Content experts: Thesis or dissertation in the field; undergraduate or specialization monograph; participation in research groups/projects in the field*; teaching experience; practical work; work supervision; authorship of two articles published in journals in the field* and participation in evaluation boards. Experts in the technical field: professional specialist in the field*; professional experience; and specialization in the field.
Wild CFW et al <sup>(27)</sup>	Brazil/2019	Booklet	Rev Bras Enferm	Oliveira et al <sup>(28)</sup> adapted - Content experts: experience with the subject; post-graduate degree and scientific production related to the area*; and have scientific production related to the development of technologies. Experts in the technical area: have at least two years of experience in the field; have at least a <i>lato sensu</i> postgraduate degree; scientific production and experience in teaching.
Galdino YLS et al <sup>(29)</sup>	Brazil/2019	Booklet	Rev Bras Enferm	Criteria drawn up by the authors themselves - Content experts (researchers/teachers): researchers/doctors with experience in the field*. Content experts (assistants): nurses with experience in clinical care in the area*. Technical experts: professionals with experience in design and marketing.
Maia SF et al <sup>(30)</sup>	Brazil/2019	Folder	Rev Bras Enferm	Criteria drawn up by the authors themselves - Content experts: Higher education in medicine or nursing, specialization in the area*, and professional experience of at least two years working in the area*.
Souza Junior VD et al <sup>(31)</sup>	Brazil/2020	Virtual reality simulator	Rev Latino-Am Enfermagem	Criteria drawn up by the authors themselves - Content experts: health professionals who have a mastery of the subject and are teachers of theoretical and practical subjects in the area*.
Bittencourt MN et al <sup>(32)</sup>	Brazil/2020	Educational manual	Rev Rene	Criteria drawn up by the authors themselves - Content experts: Have a degree, specialization, Master's, or Doctorate in the field*.
Bernardes RM et al <sup>(33)</sup>	Brazil/2020	Website	Acta Paul Enferm	Criteria drawn up by the authors themselves - Content experts: doctorate or master's degree in the area*, lecturer at a public university, with teaching experience in the area*, scientific publication related to the area* and/or lecturer on the subject at the undergraduate level. Technical experts: IT professionals with experience in website development.
Jesus GJ et al <sup>(34)</sup>	Brazil/2020	Booklet	Rev Latino-Am Enfermagem	Criteria drawn up by the authors themselves - Content experts: have clinical experience, research and publish on the subject, be an expert in the conceptual framework involved, and have knowledge of the construction/evaluation of educational material, proven through their Lattes CV.
Mello NC et al <sup>(35)</sup>	Brazil/2020	Booklet	Texto Contexto Enferm	Criteria drawn up by the authors themselves - Content experts: be a professional nurse, a specialist in the area*, and with previous experience in educational practices related to the topic.
Sena JF et al <sup>(36)</sup>	Brazil/2020	Booklet	Rev Latino-Am Enfermagem	Author's self-created criteria - Content experts: experience in the area*, published article around interest in an indexed journal, and clinical practice in the area*.
Cruz FOAM et al <sup>(37)</sup>	Brazil/2020	Educational manual	Rev Latino-Am Enfermagem	Melo et al <sup>(38)</sup> - Content experts: carry out activities in the thematic field*; have a degree, specialization, scientific production, knowledge, and time working in the area involved*.
Rodrigues LN et al <sup>(39)</sup>	Brazil/2020	Booklet	Rev Bras Enferm	Criteria were drawn up by the authors themselves - Content experts: doctorate, master's degree, in both cases they should have a thesis and/or dissertation in the area*, scientific production in the area*, at least one year's practice in the area*, specialization in the area*; participation in events in the area*; and at least one year's experience in the area*. Experts in the technical area: at least one year's experience in design and marketing; a degree in Communication; a postgraduate degree in Communication; and at least one year's experience in validating educational instruments or materials.
Santos AS et al <sup>(40)</sup>	Brazil/2020	Booklet	Rev Bras Enferm	Criteria drawn up by the authors themselves - Content experts: have a doctorate; a thesis in the field*; a master's degree; a dissertation in the field*; an article or paper published in the proceedings of scientific events in the field*; professional clinical, teaching or research experience of at least one year in the field*; specialization in the field*; at least one year's experience in evaluating educational instruments or materials. Experts in the technical area: at least one year's experience around interest (communication or design), a degree around interest, postgraduate qualifications, and at least one year's experience in validating educational instruments or materials.
Santiago RF et al <sup>(41)</sup>	Brazil/2020	Virtual learning object	Acta Paul Enferm	Criteria adapted from Freitas et al <sup>(16)</sup> - Content experts: Thesis or dissertation in the field; undergraduate or specialization monograph; participation in research groups/projects in the field*; teaching experience; practical work; work supervision; authorship of two articles published in journals in the field*; participation in evaluation boards. Experts in the technical field: professional experts in the field*; professional experience; specialization in the field.

\*Thematic area of study

Figure 2 – Description of the studies included in the review. Redenção, CE, Brazil, 2023

In terms of detailing the criteria adopted for selecting content experts in the health area, studies that considered specialization or residency in the area, or postgraduate monograph (n = 14; 48.3%) prevailed: master's degree/dissertation in the area (n = 15; 51.7%); doctorate/thesis in the area (n = 15; 51.7%); work/assistance experience without time delimitation (n = 14; 48.3%); teaching experience without time delimitation (n = 8; 27.6%); and having done the research and published a scientific article in the area (n = 13; 44.8%). Concerning the criteria for selecting experts around the technology developed, most of the studies required specialization in the area

(n = 4; 13.8%) and professional experience in developing technologies (n = 7; 24.1%) (Figure 3).

Based on the analysis of the studies, criteria are proposed to standardize the selection of experts in the process of assessing evidence of the validity of technologies. For the evaluation process with professionals from the content area, there are three domains: academic background, professional performance/experience, and productions. For the evaluation process with technology professionals, the domains established refer to academic background and professional practice/experience. It should be noted that there are various characteristics for each domain (Figure 3).

Summary of the criteria	n (%)	Proposed criteria
<b>Content experts/Academic background</b>		
Academic training (degree in the field*) or undergraduate thesis	4 (13.8)	Academic training (undergraduate degree in the field*) or undergraduate thesis (1 point)
Specialization or residency in the field* or postgraduate monograph	14 (48.3)	Specialization or residency in the field* or postgraduate monograph (2 points)
Master's degree or dissertation report in the field*	15 (51.7)	Master's degree or dissertation report in the field* (3 points)
Doctorate or thesis report in the field*	15 (51.7)	Doctorate or thesis report in the field* (4 points)
Degree (degree level not specified)	2 (6.9)	
<b>Work/professional experience</b>		
Have worked for at least one year in care in this area	6 (20.7)	Work/assistance experience for at least one year in the area* (2 points)
More than two years of experience in the area*	2 (6.9)	
More than five years of experience in the area*	2 (6.9)	
Work/assistance experience (no minimum time limit)	14 (48.3)	Teaching in the area for at least one year* (2 points)
Teaching experience with no time limit	8 (27.5)	
Teaching experience in a technical course (minimum six months)	1 (3.4)	
At least two years of teaching experience in an undergraduate course	2 (6.9)	
Lecturing on the subject at the undergraduate level	1 (3.4)	
Supervision of scientific work or participation in committees in the area† at undergraduate and postgraduate levels ( <i>lato sensu</i> or <i>stricto sensu</i> )	8 (27.5)	Guidance or participation in committees in the area† at undergraduate and postgraduate level ( <i>lato sensu</i> or <i>stricto sensu</i> ) (1 point)
Participation in a research group in the field*	5 (17.2)	Participation in a research group in the area* (1 point)
Experience in developing and evaluating technologies	3 (10.3)	Experience in developing and evaluating technologies (1 point)
		Having been a speaker or participated in a round table at a scientific event in the field* (1 point)
<b>Productions</b>		
Research reports/publication of scientific articles in the field*	13 (44.8)	Research report/publication of scientific articles/books and chapters with ISBN in the field* (2 points)
Scientific production (type of production not specified)	6 (20.7)	
Publication in proceedings or participation in scientific events in the field† of national or international*	3 (10.3)	Publication in proceedings or presentation of papers at national or international scientific events in the field* (1 point)
Passing a specific test or having a high rating from an authority	1 (3.4)	Passing a specific test or having a high rating from an authority (Organization) (1 point)
Having received a tribute/honorable mention	1 (3.4)	Have received a tribute/honorable mention/award in the field* (1 point)
		Patent or registration (1 point)

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Technical experts/Academic background		
Degree in IT, communication or related areas <sup>†</sup>	2 (6.9)	Training in IT, communication, or related areas <sup>†</sup> (1 point)
Specialization in the area <sup>†</sup>	4 (13.8)	Specialization in the area <sup>†</sup> (2 points)
Master's or Doctorate in computer science, communication, or related areas <sup>†</sup>	1 (3.4)	Master's degree or PhD in IT, communication, or related areas <sup>†</sup> (3 points)
Postgraduate degree (degree not specified)	1 (3.4)	
Professional experience		
Professional experience in technology development	7 (24.1)	Professional experience in technology development (2 points)
At least one year's experience around interest (communication or design)	3 (10.3)	
At least two years of professional experience in the field	1 (3.4)	
Teaching experience	2 (6.9)	Teaching experience of at least one year (2 points)
Research reports/publication of scientific articles <sup>†</sup>	2 (6.9)	Research report/publication of scientific articles or books and chapters with ISBN in the area <sup>†</sup> (2 points)
Publication in proceedings of scientific events in the field <sup>†</sup>	1 (3.4)	Publication in proceedings of scientific events in the area <sup>†</sup> (1 point)
Participation in research groups	1 (3.4)	Participation in research groups (1 point)
Participation in examination boards	1 (3.4)	Participation in examination boards (1 point)
		Patent or registration (1 point)

\*Area of the construct; <sup>†</sup>Area of technology, communication, designer or any area whose knowledge is essential for the development and evaluation of the technology in question

**Figure 3** – Summary of the criteria adopted for the selection of experts and proposed criteria for evaluating evidence of the validity of educational technologies. Redenção, CE, Brazil, 2023

## Discussion

Based on the studies selected in this review, the main criteria used to evaluate evidence of the validity of educational technologies in nursing were analyzed, allowing new criteria to be proposed for the selection of experts. The criteria analyzed included aspects related to the academic background, professional performance/experience, and the productions of the experts. These criteria were considered relevant to ensure the representativeness and competence of the experts selected to assess the validity of educational technologies in nursing.

The existence of criteria for selecting experts is essential for evaluating evidence of the validity of technologies in the field of nursing and has been mentioned by various authors and for different types of technologies developed. However, the diversity of criteria and how they are used with excessive adaptations indicate a lack of standardization, which could compromise the quality of the assessment of the tech

nologies developed. In addition, it was possible to see the interest and increase in the number of studies carrying out the technology assessment process recently, especially in 2019.

We observed a divergence in the criteria for selecting content experts in the scientific literature, with most studies establishing criteria developed by the authors themselves. These criteria include experience working around the technology developed; a specialist, master's, or doctoral degree in the area; scientific production or research around the technology built; teaching experience in the area; and participation in boards, guidelines, or research groups in the area.

The lack of consensus among researchers results in heterogeneous criteria for selecting experts. Thus, it was noted that the criteria used by authors considered to be referenced in the field<sup>(3-4)</sup> are often modified to adapt to the specific needs of each study, leading the authors of the studies to make adaptations to these criteria or even to develop their criteria.

A study investigating the criteria used to select

experts for validating nursing diagnoses found that researchers make these adaptations to include a larger number of participants in their samples by modifying the original statements in the criteria<sup>(3)</sup>, and the scoring system, with the professional's experience in a particular clinical area being the most modified criterion, raising whether it was an adaptation or the development of their criteria, as well as whether the professional should be considered an expert<sup>(38)</sup>.

Although the adaptations of the original criteria for the selection of experts broaden the participation of professionals, such adjustments do not maintain coherence and point to a lack of standardization in the selection of individuals<sup>(2)</sup>. Therefore, caution should be exercised when making adaptations to the criteria for selecting experts, as the changes made by the researcher can completely alter the criteria, making them different from the original statements and scores of the author referenced as the target of the adaptation.

Regarding the criteria for academic training, the importance of postgraduate studies, both at the *lato sensu* and *stricto sensu* levels, is noteworthy, since postgraduate studies are characterized by the permanent pursuit of excellence, reflecting on professionals through the production of knowledge and the development of skills in specific subjects<sup>(42)</sup>.

In addition, some of the studies analyzed highlighted teaching as a point to be considered, given that experience and knowledge of teaching-learning strategies in a specific area make the teacher a specialist<sup>(43)</sup>. Thus, pedagogical knowledge of the subject is also important for teachers to be able to assess evidence of the validity of educational technologies.

Concerning the criteria for publications, the presentation of papers, participation in scientific events, and the production of papers in periodicals provide updating and dissemination of innovations about interest to educational technology, as they allow professionals to increase their level of expertise<sup>(2)</sup>.

Furthermore, the expertise of the evaluators must consider a combination of essential aspects, including their work and practical experience on the subject of interest<sup>(44)</sup>. For the present study, a mini-

mum of one year's professional practice may be adequate for an individual to have sufficient experience to be able to assess the evidence of the validity of educational technologies; this was the minimum time limit for experience found in most of the studies analyzed.

It should be noted that this decision was in line with a study that pointed out that professionals with less than a year's experience may indicate a lack of adequate experience. On the other hand, experience of more than five years can make it difficult to participate in validation studies due to the multiple activities in which this professional can be involved<sup>(2)</sup>. In addition, for recruitment, it is also understood that expertise cannot be guaranteed only by the length of experience, but also by considering that, through critical thinking, the situation experienced can change the individual's behavior<sup>(5)</sup>.

Although the studies analyzed did not include the publication of books or chapters for the selection of experts, this type of publication is another way of disseminating scientific production. In addition, it is considered intellectual production in the productivity requirements included in the evaluation of the Coordination for the Improvement of Higher Education Personnel (CAPES) for the area of nursing<sup>(45)</sup>. Considering this, including this criterion in the selection of experts guarantees consistency in the classification of academic and teaching output.

Furthermore, given the technological innovations that have been taking place in the field of nursing, registrations, and patents have been considered relevant technical productions, as they involve the generation of knowledge and the production of products and processes with innovation potential<sup>(46)</sup>. Because of this, the inclusion of this criterion in the selection of experts for technology assessment is necessary, as it accompanies the evolution of nursing and reflects the professional's ability to understand the challenges and demands of technological development.

In the studies analyzed, no aspects were considered that indicate that a professional is considered an expert in some area because they have been a speaker or participated in a round table at scientific events.



However, when a professional is invited to report on their experiences or studies in a particular area, it is believed that they have differentiated knowledge that makes them a reference in the field; after all, it is known that scientific events promote the dissemination of up-to-date knowledge, innovative practices, and research results<sup>(2)</sup>.

The analysis indicated that only 11 articles mentioned criteria for selecting technical experts. Despite this, it should be noted that this group of experts is essential for the construction and evaluation of educational technologies due to their specific knowledge of the type of technology being developed, enabling them to assess the technical, design, and functional quality of the educational material with greater accuracy<sup>(39)</sup>. It should also be noted that professional experience in developing technology and specialization in the area are crucial points for selecting technical experts, as these were the aspects most cited in the articles analyzed.

It was decided to adopt a system of criteria for selecting experts based on scores since most of the studies established some kind of minimum criterion for including an expert. Thus, a minimum of five points was adopted for content experts and a minimum of three points for technical experts. This standardization of scores was maintained with the addition of criteria in a single proposal, obtained both by synthesizing the articles and through a critical analysis of the literature. This proposal of criteria may allow more professionals to achieve the minimum score required, since studies have indicated that it is difficult to reach a sizable sample of experts to assess the evidence of the validity of nursing technologies<sup>(47-48)</sup>.

It is therefore essential that the researcher sets out their criteria clearly about the objectives of the study, respecting the characteristics necessary for the selection of experts and justifying the reasons for using each one.

## Study limitations

A limitation of this review is the limited num-

ber of studies that mentioned criteria for selecting technical experts to evaluate the technology developed.

## Contributions to practice

This review contributed to the synthesis of the literature and the development of new criteria, given the need for standardization in the selection of experts who assess the evidence of the validity of educational technologies used in nurses' daily practice. Therefore, the proposal of new criteria in a comprehensive and up-to-date manner, based on the literature, is essential to guide researchers and health professionals in the development and evaluation of educational technologies in the nursing field to promote the health of the population.

## Conclusion

It was found that most studies did not cite a reference to determine the criteria for selecting experts, nor did they establish a minimum score for selecting experts.

The following characteristics can be listed among the criteria adopted by the articles for selecting the experts: having a doctorate/thesis in the area; a master's degree/dissertation in the area; specialization or residency in the area, or postgraduate monograph; experience in care or teaching; having published research or articles in the area; as well as having professional experience in developing technologies.

## Authors' contribution

Conception and design or analysis and interpretation of data; writing of the manuscript or relevant critical review of the intellectual content; final approval of the version to be published; responsibility for all aspects of the text in ensuring the accuracy and integrity of any part of the manuscript: Melo ESJ, Silva MJN, Silva APN, Braga HFGM, Oliveira BSB, Monteiro FPM, Barbosa LP.

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