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REVIEW PROTOCOL

Teaching and Learning with a Multisensory Approach in Undergraduate Nursing Education: Scoping Review Protocol

Ensino e aprendizagem com abordagem multissensorial na graduação em enfermagem: protocolo de revisão de escopo

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ABSTRACT

Objective: To describe instructional strategies and resources used with a multisensory approach for face-to-face teaching of undergraduate nursing students and to summarize the authors' discussions/conclusions regarding the impact of teaching with this approach on the student's learning process. **Methods:** The Joanna Briggs Institute (JBI) methodology was used to develop this protocol and will be used to conduct and report the scoping review. There will be no restrictions on language, date, or type of publication. Sources of information will include PubMed, Cumulative Index in Nursing and Allied Health Literature (CINAHL), PsycINFO, Scopus, Excerpta Medica Database (EMBASE), Web of Science, Educational Resources Information Center (ERIC), Virtual Health Library (VHL) portal, Scientific Electronic Library Online (SciELO), ProQuest, and five sources of grey literature. Rayyan and JBI SUMARI software are used for study selection. Title and abstract screening, full-text reading, and data extraction will be performed by two independent reviewers using a tool developed and tested by the authors. If necessary, a third reviewer will be involved. The results will be presented in a narrative format, graphs, or tables.
Descriptors: Nursing Education; Teaching Materials; Perception.

RESUMO

Objetivo: Mapear estratégias e recursos instrucionais utilizados com abordagem multissensorial para o ensino presencial de graduandos em Enfermagem e resumir as discussões/conclusões dos autores em relação às repercussões do ensino com essa abordagem no processo de aprendizagem dos graduandos. **Método:** A metodologia Joanna Briggs Institute (JBI) foi utilizada para o desenvolvimento deste protocolo e será empregada para conduzir e relatar a revisão. Não haverá restrição quanto ao idioma, data ou tipo de publicação. As fontes de informação incluirão PubMed, *Cumulative Index in Nursing and Allied Health Literature* (CINAHL), PsycINFO, Scopus, *Excerpta Medica Database* (EMBASE), Web of Science, *Educational Resources Information Center* (ERIC), portal da Biblioteca Virtual de Saúde (BVS), Scientific Electronic Library Online (SciELO), ProQuest e cinco fontes de literatura cinzenta. Os softwares Rayyan e JBI SUMARI serão utilizados para a seleção dos estudos. A seleção dos títulos e resumos, leitura integral dos textos e extração de dados serão realizadas por dois revisores independentes, utilizando um instrumento elaborado e testado pelas autoras. Se necessário, um terceiro revisor será incluído. Os resultados serão apresentados em formato narrativo, diagramas ou tabelas.
Descritores: Educação em Enfermagem; Materiais de Ensino; Percepção.

INTRODUCTION

Teaching with a multisensory approach involves utilizing visual, auditory, kinesthetic, and tactile resources to enhance memory and facilitate learning[1]. In the educational process, instructors employ the multisensory approach by connecting academic objectives to educational activities that require students to engage multiple senses, thereby creating mental representations of objects, concepts, or phenomena[2].

Teaching focused on sensory integration plays a crucial role in improving working memory[3], which is understood as a form of short-term memory where information is simultaneously stored, processed, or manipulated to

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perform complex cognitive tasks and is related to long-term memory[4].

Indeed, there are unisensory and multisensory neurons in the central nervous system, and when information from different sensory modalities is congruent, it is integrated to produce enhanced neural and behavioral outcomes[5].

In this regard, stimulating different modalities (visual, auditory, and kinesthetic) is used in the education of children with learning difficulties[6] and in inclusive education to facilitate learning for individuals with visual or auditory deficits[2].

In undergraduate health education, there are reports of using the multisensory approach in teaching students with dyslexia and dyscalculia[7].

In nursing education, authors of studies involving newly graduated nurses and undergraduate nursing students have implemented various activities (such as reading poems aloud, using strings and cartoons, among others) targeting the cognitive, affective, and psychomotor domains of learning. They concluded that multisensory training could enhance learning and support the development of a creative and sustainable professional career, providing nursing educators with opportunities to enrich their teaching toolkits and foster individual and collective learning beyond traditional didactic formats[8].

In undergraduate nursing education, careful examination reveals publications that describe the use of diverse resources to stimulate the different sensory modalities of students (such as multicolored buttons, dishes, nose plugs[9], canvas, balloons, and colored adhesive tapes[10]). However, they do not explicitly state the intentional use of the multisensory approach. In this context, mapping studies that have applied the multisensory approach in undergraduate nursing education will help understand the teaching strategies employed and the outcomes achieved in student learning.

A preliminary search was conducted in the Medical Literature Analysis and Retrieval System Online (MEDLINE), The International Prospective Register of Systematic Reviews (PROSPERO), Cochrane Database of Systematic Reviews and JBI Evidence Synthesis databases using the keywords "Multisensory", "Multisensory approach", "Multisensory learning", "Multisensory teaching", and "Multisensory instruction" on December 9, 2022. However, no systematic or scoping reviews (completed or ongoing) were found on teaching and learning with a multisensory approach in the context of nursing education.

Therefore, there is a justified need to conduct a scoping review with the objectives of mapping instructional strategies and resources used with a multisensory approach in undergraduate nursing education and summarizing authors' discussions/conclusions regarding the impact of teaching with this approach on students' learning process. These impacts will be assessed considering cognitive responses (knowledge/skills acquired), affective responses (changes in interest, attitudes, emotions, or values), and psychomotor responses (development of motor skills)[11].

The results of this review will likely contribute to mapping the available evidence on the use of the multisensory approach in the learning of undergraduate nursing students, considering cognitive, affective, and/or psychomotor aspects.

Review questions

Two review questions were formulated based on the PCC (population, concept, and context) framework:

1. What educational strategies and instructional resources have been used to teach undergraduate nursing students using a multisensory approach in any educational context or setting?
2. What are the findings and conclusions of studies on the learning outcomes of nursing students when using the multisensory approach?

Inclusion criteria

Participants

Studies with undergraduate nursing students will be included as individuals enrolled in a school or program of higher education at the undergraduate nursing level[12], at in any stage of the program, in any teaching setting, or any public or private educational institution. Studies must meet all three of the following criteria:

1. Studies that describe educational strategies or instructional resources used in a class, course, training, clinical activity, or laboratory activity to teach a topic or subject.
2. Studies that used strategies or resources to promote object manipulation or tactile sensation, sensations derived from any part of the body's skin (touch), stimulation of taste perception (taste), promotion of verbal expression (language), use of pictures, shapes, colors, and spatial vision stimulation (vision), verbal sounds, tones, melodies, or music (hearing), stimulation of smell or odor perception (smell), or intentional stimulation of physical movement.

Educational strategies refer to the processes used for communication between teachers and students[13]. These include but are not limited to technology-based, simulation-based, and collaborative strategies[14]. Instructional resources refer to tools or vehicles used to facilitate communication between teachers and students, using tangible materials or real objects to engage students' senses, help teachers make sense of abstractions, and simplify complex messages[13]. This review includes but is not limited to, buttons, nose plugs, utensils[9], balloons and colored ribbons[10], flipcharts, and puppets[13].

3. Studies in which the authors describe results and conclusions regarding the learning outcomes of undergraduate nursing students when using the multisensory approach.

Concept

The concept of this review is multisensory learning, which refers to the learning process that uses combinations of two or more senses, and may include visual, auditory, tactile, kinesthetic, olfactory, and gustatory sensations[3].

Context

The context of this review will encompass environments where teaching and learning activities occur, including classrooms, laboratories, hospitals, communities, or any other setting/context where face-to-face instruction, training, or practical activities occur, regardless of country.

Types of sources of evidence

Studies will be considered without restriction as to type or design, year of publication, or language, as long as they meet the inclusion criteria. However, methodological studies on the development of instructional resources that primarily aim to assess the functionality of the resource without the explicit intention of teaching a specific topic in an instructional context will be excluded.

METHODS

This review will follow the Joanna Briggs Institute (JBI) methodology for scoping reviews[15]. The entire protocol is registered on the Open Science Framework (OSF) and can be accessed via the following link: https://osf.io/v3j5x. In addition, the protocol update can be found at this link: https://osf.io/6g7xk/?view_only.

Search strategy and sources of information

Both published and unpublished studies (grey literature) will be considered. An initial search was conducted in MEDLINE (PubMed) and Cumulative Index in Nursing and Allied Health Literature (CINAHL/EBSCO) through the Capes Periodicals Portal to identify relevant studies. The words contained in the titles, abstracts, terms, and keywords of the relevant studies were used to develop a comprehensive and tailored search strategy for MEDLINE (PubMed) and CINAHL (EBSCO), as described in Figure 1.

Similarly, the initial search guided the development of appropriate strategies for each other information source. Double (or single) quotation marks, operators (AND, OR) and other search strategies were used in the databases and grey literature, as described in Figure 2.

Since only one database has a descriptor closely related to the concept of the study (multisensory learning in ERIC) and another has "candidate terms" (Embase), broad search strategies were adopted for all databases. After removing duplicates, a total of 2,121 unique items were retrieved.

The search strategies were defined by the reviewers with the assistance of a librarian. Additionally, the reference lists of all selected studies will be checked to identify additional studies.

Study selection

The study selection process will be presented in a flowchart based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Extension for Scoping Reviews (PRISMA-ScR) guidelines[16], following the established inclusion criteria. All retrieved studies will be imported into the Mendeley reference manager, where duplicates will be removed. Subsequently, the studies will be imported into the Rayyan software, where titles and abstracts will be read and assessed (in a blinded manner) by two independent reviewers. Potentially relevant studies will be obtained in full text and imported into the JBI Sumari software[17], where two independent reviewers will assess them. If necessary, the authors of the included studies will be contacted. The reasons for excluding studies assessed in the full text will be recorded and reported. Any disagreements that arise between the reviewers

Search #	Search strategy	Recovered records
Pubmed (MEDLINE): December 3, 2022		
1	Education, Nursing [mh] OR Students, Nursing[mh] OR Education, Nursing, Baccalaureate [mh] OR "Nursing Students" [tw] OR "Nursing Student" [tw] OR "Baccalaureate Nursing Education"[tw] OR "nursing education" [tw] OR "undergraduate nursing student"[tw]	147.938
2	Multisensory[tw] OR "Multisensory Learning"[tw] OR "Multisensory Teaching"[tw] OR "Multisensory Approach"[tw] OR "multisensory stimulation"[tw] OR "multisensory instruction" [tw] OR "Sensory Integration"[tw] OR "Intersensory integration" [tw] OR Kinesthetic[tw] OR "kinesthetic senses" [tw] OR "visual stimulation"[tw] OR "kinesthetic learning" [tw] OR "hearing stimulation" [tw] OR "tactile stimulation"[tw] OR stimulation [tw] OR "Tactile Sense"[tw] OR "sensory experience"[tw] OR Kinesthesis [tw] OR kinaesthetic [tw] OR "teaching materials"[tw] OR "multisensory Technologies"[tw]	824.925
3	Learning[mh] OR Cognition[mh] OR Memory[mh] OR Cognition [tw] OR Learning [tw] OR Memory[tw] OR Retention, Psychology*[mh]	1.124.878
4	1 AND 2 AND 3	292
CINAHL (Ebsco): December 3, 2022		
S1	MH ("education, nursing" OR "students, nursing" OR "students, nursing, baccalaureate") OR SU ("nursing student" OR "nursing students" OR "students nursing baccalaureate" OR "undergraduate nursing" OR "Education and training" OR "Education, Nursing, Baccalaureate") OR AB ("nursing student" OR "nursing students" OR "students nursing baccalaureate" OR "undergraduate nursing" OR "Education and training" OR "Education, Nursing, Baccalaureate")	97.628
S2	TX ("multisensory learning" OR "multisensory processing" OR "multisensory instruction" OR "multisensory stimulation" OR"multisensory teaching" OR "multisensory approach" OR "intersensory integration" OR "sensory integration" OR sensory OR "sensory stimulation" OR "sensory education" OR "sensory experience" OR "sensory stimulation" OR "kinaesthetic learning" OR "kinesthetic senses" OR "kinesthetic learning in the classroom" OR kinesthesia OR "kinesthetic learning strategies" OR "kinesthetic learning methods" OR "visual stimulation" OR "visual stimuli" OR "tactile stimulation" OR "tactile sensation" OR "hearing sense" OR "Acoustic Stimulation" OR "Tactile Touch" OR neuroeducation) OR SU ("multisensory learning" OR "multisensory processing" OR "multisensory instruction" OR "multisensory stimulation" OR "multisensory teaching" OR "multisensory approach" OR "intersensory integration" OR "sensory integration" OR sensory OR "sensory stimulation" OR "sensory education" OR "sensory experience" OR "sensory stimulation" OR "kinaesthetic learning" OR "kinesthetic senses" OR "kinesthetic learning in the classroom" OR kinesthesia OR "kinesthetic learning strategies" OR "kinesthetic learning methods" OR "visual stimulation" OR "visual stimuli" OR "tactile stimulation" OR "tactile sensation" OR "hearing sense" OR "Acoustic Stimulation" OR "Tactile Touch" OR neuroeducation)	78.741
S3	MH (Learning OR Cognition OR Memory) OR TX (Learning OR Cognition OR Memory) OR SU (Learning OR Cognition OR Memory)	608.414
S4	S1 AND S2 AND S3	216

Source: Developed by the authors, 2023.

Figure 1 - Search strategy in the MEDLINE database via PubMed and CINAHL via EBSCO. São Paulo, SP, Brazil, 2023

Sources of information	Observations on the development of the advanced search strategy. Use of:
PsycINFO	Index terms and broader, narrower, related terms.
SCOPUS	Campo de busca TITLE-ABS-KEY (Título, Resumo e palavras-chave).
Embase	Emtree terms and synonyms, terms marked as "This is a candidate term"; single quotation marks; all fields.
Web of Science Core Collection	TS field (Titles, Abstracts, Keywords and Indexing).
Biblioteca Virtual em Saúde	DECS structured vocabulary and its synonyms.
Scientific Electronic Library Online	Campo de busca: ab (resumo).
Centro de Informação de Recursos Educacionais (ERIC)	The database did not provide access to advanced search, even through the Capes Periodicals Portal. Therefore, the identification of specific descriptors (Thesaurus) was conducted, along with the use of broader, narrower, and related terms, as well as the available advanced search features on the simple search page: descriptorx (Nursing Education and Nursing students) and sourcex (Higher Education).
ProQuest	"Search field ab (abstract), ft (article body), pub (journal title), ti (article title) and su Subject Heading(All)".
Gray Literature	
ProQuest (for dissertations and theses)	The "ProQuest Dissertations & Theses" database did not provide direct access via the Capes Periodicals Portal. However, dissertations and theses were retrieved from the results obtained through ProQuest.
Open Access Theses and Dissertations	Search field ab (abstract).
Biblioteca Digital Brasileira de Teses e Dissertações	Search field: abstract.
Google Scholar	Advanced search and "occurrence of my words": anywhere in the article.
Open Gray	Search field: Any Field.

Source: Developed by the authors, 2023.

Figure 2 - Advanced search strategy according to the other sources of information. São Paulo, SP, Brazil, 2023

at each stage of study selection will be resolved through discussion or with the involvement of a third reviewer.

Data extraction

The data from the included studies will be extracted using an instrument specifically developed for this purpose (Figure 3), which has been tested through the full reading of two studies.

Any disagreements that arise between the reviewers during the data extraction process will be resolved by discussion between the reviewers or, if necessary, with the intervention of a third reviewer. If missing or additional data are required, the study authors will be contacted to request this information.

Data presentation

The extracted data will be presented in graphs or tables consistent with the objectives of this scoping review. In addition, a narrative summary will be provided to accompany the tabular or graphical results, describing how the results relate to the objectives and research questions of the review.

CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

Items to be extracted	Study 1	Study 2	....
Citation (authors, title, year, journal)			
Language			
Objectives			
Type of study/publication			
Sample			
Semester/year of undergraduate course			
Country of college/university			
Topic covered in the class/training			
Teaching strategy used			
Instructional resources used			
Which sensory modalities were stimulated or promoted by the instructional strategies and resources?	□ Visual □ Auditory □ Tactile □ Speech □ Taste □ Olfactory		
Environment where the class/training took place			
Did the instructional strategy or resources stimulate body movement (kinesthesia)?	□ Yes □ No		
Authors' findings/discussions/conclusions regarding the cognitive, affective, and psychomotor responses of the multisensory approach in students' learning.			
Consequences for practice/teaching/research according to the authors.			

Source: Developed by the authors, 2023.

Figure 3 - Data extraction instrument. São Paulo, SP, Brazil, 2023

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