

## Using the theory of meaningful learning in nursing education

*A utilização da teoria da aprendizagem significativa no ensino da Enfermagem*

*El uso de la teoría del aprendizaje significativo en la educación de enfermería*

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### ABSTRACT

**Objective:** to synthesize the scientific literature about the Theory of Meaningful Learning in the process of teaching and learning in nursing. **Method:** this is an integrative review conducted in the databases MEDLINE, LILACS, SciELO, BDENF and CINAHL with studies addressing the subject or aspects of the theory of meaningful learning of David Ausubel. Ten studies were included, from which six were written in Portuguese and four in English, published from 1998 to 2013. **Results:** five studies used the theory of meaningful learning, four studies cited Ausubel as the author of this theory and only two studies followed the framework for the application of the theory completely. There are only a few studies on this subject and those which explore it are not correlated with Ausubel's theory. **Conclusion:** it is necessary to break with the dichotomy between theory and practice and promote the articulation of content with action, introducing the student as the author of their own knowledge.

**Key words:** Nursing; Teaching; Learning.

### RESUMO

**Objetivo:** sintetizar a produção científica acerca da Teoria da Aprendizagem Significativa no processo de ensino-aprendizagem em Enfermagem. **Método:** revisão integrativa realizada nas bases de dados MEDLINE, LILACS, SciELO, BDENF e CINAHL, com artigos que abordaram a temática ou aspectos da teoria da aprendizagem significativa de David Ausubel. Fizeram parte da amostra dez artigos, sendo seis escritos no idioma português e quatro no inglês, publicados de 1998 a 2013. **Resultados:** cinco artigos fizeram alusão à Teoria da Aprendizagem Significativa, quatro citaram Ausubel como autor dessa teoria e apenas dois seguiram a estrutura para a aplicação da teoria completamente. Há escassez de estudos sobre o tema e os que o abordam não o correlacionam com a teoria de Ausubel. **Conclusão:** faz-se necessário romper com a dicotomia entre teoria e prática e promover a articulação dos conteúdos com a ação, introduzindo o aluno como autor de seu próprio conhecimento.

**Descritores:** Enfermagem; Ensino; Aprendizagem.

### RESUMEN

**Objetivo:** sintetizar la literatura científica acerca de la teoría del aprendizaje significativo en el proceso de enseñanza y aprendizaje en enfermería. **Método:** se trata de una revisión integradora realizada en las bases de datos MEDLINE, LILACS, SciELO, BDENF y CINAHL con artículos que abordan el tema o aspectos de la teoría del aprendizaje significativo de David Ausubel. Las muestra de diez artículos, los cuales seis escritos en portugués y cuatro en Inglés, publicados entre 1998 y 2013. **Resultados:** cinco artículos aludieron a la teoría del aprendizaje significativo, Ausubel cuatro citados como el autor de esta teoría y sólo dos siguieron el marco para la aplicación teoría por completo. Hay pocos estudios sobre este tema y los que aluden a un aprendizaje significativo a menudo no se correlacionan con la teoría de Ausubel. **Conclusión:** es necesario romper con

la dicotomía entre la teoría y la práctica y promover la articulación de los contenidos con la acción, introduciendo al alumno como el autor de su propio conocimiento

**Palabras clave:** Enfermería; Enseñanza; Aprendizaje.

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## INTRODUCTION

The general basis of the educational process is based on the condition that men do not have all the knowledge they want and find what they need to prepare and constantly invest in their actions in the world, assimilating new knowledge and updating existing knowledge. It is this ability to act, operate and transform the social environment which makes man a being of praxis, in constant action and reflection. Thus, education is consolidated in the transformation of being at the same time that intervenes in reality and is transformed by it<sup>(1)</sup>. It is, then, an act that requires the participation of the actors involved in this process - the teacher/professor and the student. This is justified because, through interaction, new things are built which generates an adaptive-dynamic, from what is meaningful to the student.

In general, learning is meaningful when the knowledge begin to make sense to learn and practice for learners<sup>(2)</sup>. The Theory of Meaningful Learning was proposed by psychologist David Ausubel, who excelled in the fields of Developmental Psychology, Educational Psychology, Psychopathology and ego development. Ausubel was descended from Jewish, born in New York in 1918 and died in 1994 at the age of 75. He thought and wrote until the end of his life<sup>(3)</sup>.

Ausubel published his first studies on the Theory of Meaningful Learning in 1963 and at the end of the 1970s, received the contribution of Joseph D. Novak to refine it with a humanistic connotation and its propagation. In 1975, Ausubel was at the Pontifical Catholic University of Sao Paulo (PUC-SP) and coordinated a seminar with several researchers<sup>(4)</sup>.

Since the 1970s, the theory has been enriched, interpreted and published by Marco Antonio Moreira, Elcie F. Salzano Masini, among other scholars in Brazil<sup>(5)</sup>. Currently, Marco Antonio Moreira, Professor of Physics at the Federal University of Rio Grande do Sul (UFRS), whose PhD supervisor was Joseph Novak, added a critical view of this theory. For him, besides meaningful learning, one must be critical and questioning of this knowledge to know how to deal with the uncertainties and changes in contemporary life<sup>(2)</sup>.

Ausubel assumes that new knowledge must be acquired from a material that is interesting (meaningful) to the learner and anchored on their prior knowledge. The interaction of new knowledge with the existing ideas allows, through its cognitive activity, the learner to develop new meanings, which are unique to them<sup>(6)</sup>. According to this theory, teaching means creating situations that foster meaningful learning<sup>(6)</sup>. For the author, the term "meaningful" is a phenomenological learning

process that occurs when the learner incorporates content to a potentially significant symbol in their cognitive structure, becoming a cognitive content<sup>(2)</sup>. Thus, meaningful learning implies assigning meanings to new knowledge, with personal components present in the cognitive system of each subject.

It is through the assimilation process at the stage of meaningful learning that selective anchoring of learning material to relevant ideas in the existing cognitive structure occurs; the interaction between the new ideas presented and relevant existing ideas (anchored), that allows the meaning of the first to emerge as a product of this interaction. Thus, the connection of new emerging meanings anchored to the ideas corresponding to the memory range (retention) is an essential condition to learn something. However, this cognitive space, still cannot believe that learning is dynamic<sup>(2)</sup>, because to reach meaningful learning two conditions are required: first, the student willingness to learn. If he/she only wants to store content, learning will be mechanical, with no incorporation of knowledge to what he/she already knows. Second, the presented content has to be logical and psychologically meaningful. The logical meaning is clear, coherent, and the psychological meaning is the experience that each individual brings from their point of view, their previous experiences. Thus, each student make a selection of the content that he/she considers meaningful or not<sup>(7)</sup>.

Meaningful learning is not a new concept, but a constructivist approach mentioned in official documents of the Brazilian education reformation, according to the National Curriculum Parameters dating from 1997:

The concept of meaningful learning, centered in the constructivist perspective, necessarily implies the symbolic work of "meaning-making" as part of the reality known. The learning that students build in school will be meaningful as we succeed in establishing substantive and non-arbitrary relations between school topics and knowledge previously constructed for them, in a process of articulation of new meanings<sup>(8)</sup>.

Although the literature on learning indicates that the Theory of Meaningful Learning lies anchored in constructivism, it can also be added to the cognitive perspective, because it is conceived as a process of understanding, reflection and assigning meanings of the subject in interaction with their social environment, while building culture and being constituted by it<sup>(9)</sup>.

Under the Nursing scope, the theory proposed by Ausubel can be used for the education of health professionals, with emphasis on the presentation of the new, the current, the different for the re-elaboration of concepts, from the prior

knowledge and retention of what makes sense and is meaningful for the transformation of professional practice.

Additionally, it is noteworthy that the Nursing Education assumptions are based on a consolidated basis and follow the existence of the new national policy on education and training of human resources, through a learning that should be meaningful, producing and promoting meaning<sup>(10)</sup>.

Thus, it is necessary to understand the application of the teaching and learning theories that can help the promotion of transformation in teaching, structured through problematization of the working process, aiming to transform professional practices, organizing work and strengthening Nursing's own knowledge. Given the above, this study aims to synthesize the scientific literature about the Theory of Meaningful Learning in the teaching and learning process in Nursing.

## METHOD

The integrative review of literature method was used, as it enables us to synthesize studies as well as coming to conclusions from a topic of interest<sup>(11)</sup>. As we conducted an integrative review, the steps followed were: topic identification and selection of the hypothesis or research question; establishment of inclusion and exclusion criteria for studies, sampling or literature search; definition of the information to be extracted from selected studies and categorization of studies; assessment of included studies in the integrative review; interpretation of results; and presentation of the review or synthesis of knowledge<sup>(12)</sup>.

In the first step, the following research question was elaborated: How many scientific studies are there on the Theory of Meaningful Learning in the process of teaching and learning in Nursing?

The literature search was conducted over the Internet, in the Virtual Health Library (VHL) and CAPES *Portal* in the period from October to December 2014. The criteria used to select the sample were: intervention studies that addressed the topic or aspects of the Theory of Meaningful Learning, in all areas of Nursing interest, in English, Portuguese or Spanish, with no limit for publication year. Figure 01 presents the search strategy according to the characteristics of each database.

The information extracted from each of the studies were: journal title, database, year of publication, study title, objective, regarding the Theory of Meaningful Learning or David Ausubel, meaningful learning definition, teaching strategies and Theory mode of application.

The reading of the material was performed by three investigators independently. The discussion phase of the main results found in the studies occurred through successive analyzes and reflections on their contributions to the construction of knowledge in Nursing, based on the theory of meaningful learning. In this sense, ten studies composed the sample, six studies were written in Portuguese and four in English, published from 1998 to 2013.

The presentation of the review or synthesis of knowledge consisted of the elaboration of the document which included a description of the steps taken by the reviewer and the main results highlighted the analysis of the included studies. In presenting the synthesis of knowledge related to the teaching and learning process with the use of the Theory of Meaningful Learning to Nursing practice.

## RESULTS

The results showed that there is a concentration of publications between 1998 and 2013, the largest quantity in the

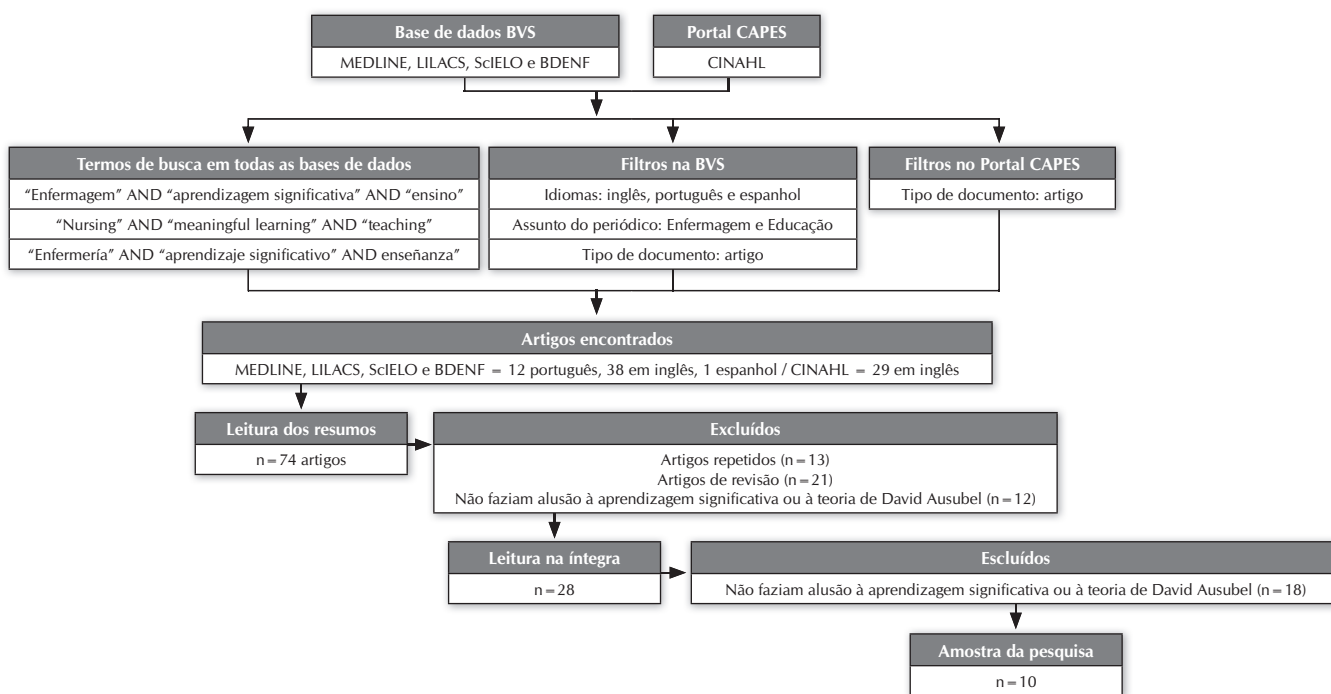


Figure 1 - Flowchart of the search and selection of studies

journal *Revista da Escola de Enfermagem da USP*, with various experiences of courses offered with the assumptions of the Theory of Meaningful Learning, as shown on Box 1.

According to LILACS Database, which reaches Latin America and the Caribbean, it seems that on these continent most studies on intervention items involving the theory with in Nursing is concentrated in national journals, although it is

a theory from the American Psychology. MEDLINE, SciELO and CINAHL with global scopes, also confirm this result. According to the established criteria, studies in the BDEFN database were not found.

The results showed that three studies<sup>(13,15-16)</sup> explored the Theory of Meaningful Learning, and three studies cited David Ausubel as the author of this theory<sup>(13-14,16)</sup>.

**Box 1** - Selected studies that composed the sample

Nº	Journal/ authors	Study title	Database/ Year of publication	Objectives
01 <sup>(13)</sup>	<i>Revista da Escola de Enfermagem da USP</i> Mendonza and Peniche	<i>Intervenção educativa sobre hipotermia: uma estratégia de ensino para aprendizagem em Centro Cirúrgico</i>	LILACS MEDLINE SciELO 2012	<ul style="list-style-type: none"> <li>To know social and training characteristics of nursing assistants;</li> <li>To identify the difference in knowledge about hypothermia in nursing assistants after the educational intervention;</li> <li>To associate the knowledge to the studied social and training variables.</li> </ul>
02 <sup>(14)</sup>	<i>Revista da Escola de Enfermagem da USP</i> Mendonza, Peniche and Püschel	<i>Conhecimento sobre hipotermia dos profissionais de Enfermagem do Centro Cirúrgico</i>	LILACS MEDLINE SciELO 2012	<ul style="list-style-type: none"> <li>To know the sociodemographic characteristics of Nursing assistants who worked in operating room;</li> <li>To identify, in Nursing assistants, the difference in knowledge about hypothermia before and after the educational intervention;</li> <li>To associate knowledge to the studied sociodemographic variables.</li> </ul>
03 <sup>(15)</sup>	<i>Revista Brasileira de Enfermagem</i> Prado, Vaz and Almeida	<i>Teoria da aprendizagem significativa: elaboração e avaliação de aula virtual na plataforma Moodle</i>	LILACS MEDLINE SciELO 2011	<ul style="list-style-type: none"> <li>To develop and evaluate the virtual lecture on the "Theory of Meaningful learning" available on Moodle</li> </ul>
04 <sup>(16)</sup>	<i>Rev. da Escola de Enfermagem da USP</i> Silva et al.	<i>Construção de um Vê de Gowin para análises de produções acadêmicas de Enfermagem</i>	LILACS SciELO MEDLINE 2013	<ul style="list-style-type: none"> <li>To build a proposal to amend the model suggested by Moreira and Buchweitz with the use of the elements that composes the procedural history of the Theory of Nursing Praxis Intervention in Public Health (TIPESC) and analyze a dissertation produced in this area of expertise</li> </ul>
05 <sup>(17)</sup>	<i>Interface Comunicação, saúde e educação</i> Kalinowski et al.	<i>Metodologias participativas no ensino da administração em Enfermagem</i>	LILACS SciELO 2013	<ul style="list-style-type: none"> <li>To report the teaching experience in the area of business and management in health in the application process and evaluation of participatory practice of learning, with students from the Undergraduate Course in Nursing, in the discipline of Planning and Health Administration</li> </ul>
06 <sup>(18)</sup>	<i>Texto &amp; Contexto Enfermagem</i> Villela, Maftum and Paes	<i>O ensino de saúde mental na graduação de enfermagem: um estudo de caso</i>	LILACS 2013	<ul style="list-style-type: none"> <li>To describe how mental health education is developed in an undergraduate nursing course and see how the mental health education influences the training of students</li> </ul>
07 <sup>(19)</sup>	<i>Nurse Education in Practice</i> Price, Dornan and Quail	Seeing is believing e Reducing misconceptions about children's hospice care through effective teaching with undergraduate nursing students	MEDLINE CINAHL 2013	<ul style="list-style-type: none"> <li>To ensure that nurses have clear knowledge of palliative care for children at an early stage of the course</li> </ul>
08 <sup>(20)</sup>	<i>International Journal of Palliative Nursing</i> Brajtman, Higuchi, and Murray	Developing meaningful learning experiences in palliative care nursing education	MEDLINE 2009	<ul style="list-style-type: none"> <li>To describe learning experiences within a nursing program designed to enhance skills of clinical decision-making of students in the context of palliative care and inter-professional practice</li> </ul>

Continues



Box 1 (cont.)

Nº	Journal/ authors	Study title	Database/ Year of publication	Objectives
09 <sup>(21)</sup>	Issues and Innovation in Nursing Education  Kinchin and Hay	Using concept maps to optimize the composition of collaborative student groups: a pilot study	CINAHL 2005	<ul style="list-style-type: none"> <li>To stimulate interest in the classroom to practical application of the concept map strategies as an approach so that teachers can easily use them to improve collaborative learning</li> </ul>
10 <sup>(22)</sup>	Nurse Education Today  Caelli	Shared understandings: negotiating the meanings of health via concept mapping	CINAHL 1998	<ul style="list-style-type: none"> <li>To discuss a project undertaken to explore the effectiveness of the concept map in assisting students to develop positive health concepts</li> </ul>

As presented on Box 2, for authors who have addressed the meaningful learning, the concept of “meaningful” is directly related to learning that made sense to the learner, whose concepts are pre-formed in his/her mind to acquire and form new concepts learned. Thus, only six studies brought meaningful learning definition in the perspective proposed by David Ausubel.

For two authors<sup>(17-18)</sup>, learning becomes significant when the teacher uses active methodologies in the process. Several authors present teaching strategies that can be adopted by teachers to facilitate the learning process. In this condition, the teaching strategies were: case study<sup>(13-14,18)</sup>, concept maps<sup>(13-14,21-22)</sup>, virtual environment - Moodle platform<sup>(15)</sup>, virtual library<sup>(15)</sup>, virtual tutoring<sup>(15)</sup>, videos<sup>(15,18)</sup>, forums<sup>(15)</sup>, dramatizations<sup>(17)</sup>, workshops<sup>(17)</sup>,

group discussions<sup>(18)</sup>, theoretical and practical activities<sup>(18)</sup>, participation in community projects<sup>(18)</sup>, association in participation<sup>(18)</sup>, movies<sup>(18)</sup>, field visits, problem-based methodology (PBM)<sup>(11)</sup> and problem-situation<sup>(15,17)</sup>. In the assessments, we found questionnaires<sup>(15)</sup>, quiz<sup>(15)</sup>, diary<sup>(15)</sup>, group work<sup>(17)</sup>, concept maps<sup>(21-22)</sup>, oral<sup>(18)</sup> and written<sup>(18)</sup> exams and self-assessment<sup>(18)</sup>, clinical cases.

Box 3 shows that, in order to apply the Theory in Nursing Education, there were a wide diversity of situations, including educational interventions through courses<sup>(13-14)</sup>, preparation of virtual classes<sup>(15)</sup>, use of active methods<sup>(17)</sup>, construction of Gowin's Epistemological V<sup>(16)</sup>, theoretical and practical activities<sup>(19)</sup> and concept maps<sup>(21-22)</sup>.

Box 2 - Definition of meaningful learning according to study sample

Definition of meaningful learning	Study
Expansion of the cognitive structure through the incorporation of new ideas that relate to pre-existing ideas of non-arbitrary and substantive way. Non-arbitrary means logical relationship of the new ideas with other existing and substantive is the ability of the learner has to explain what you have learned in your own words.	01 <sup>(13)</sup> e 02 <sup>(14)</sup>
Learning is effective when new information becomes meaningful to the learner through anchoring relevant aspects of their pre-existing cognitive structure, by the interaction between new and prior knowledge. For meaningful learning to occur three conditions are necessary, willingness to learn; presence of relevant concepts in cognitive structure of the learner and teaching materials with logical and psychological meaning.	03 <sup>(15)</sup>
Meaningful learning is a mechanism that facilitates the acquisition and storage of new information, since an existing knowledge in the learner's cognitive structure acts as a sort of anchor in the new knowledge.	04 <sup>(16)</sup>
Connecting existing knowledge in cognitive structure with a new structured knowledge logically, as the explicit attitude to learn and connect with the knowledge that he/she wants to absorb.	05 <sup>(17)</sup>
Meaningful learning is when there is interaction of a new material with what already exists in the student's cognitive structure.	09 <sup>(21)</sup>

Box 3 - Theory of Meaningful Learning application by the authors

Application of theory or aspects of the theory by authors	Study
They evaluated prior knowledge of Nursing assistants to identify pre-existing ideas, there was an educational intervention on hypothermia and evaluated what learned after the course offered to identify if learning was meaningful	01 <sup>(13)</sup> e 02 <sup>(14)</sup>
Preparation and assessment of virtual classes on the Theory of Meaningful learning for teaching licensed Nurses	03 <sup>(15)</sup>
Gowin's Epistemological V construction to understand the working process of nurses and medical professionals of family health.	04 <sup>(16)</sup>
A group of professors, students and nurses have developed and presented a dramatization on the life story of a fictional family. After the presentation, the director students coordinated a debate articulating the issues and answering questions. Assessment of the activity was conducted by the director group from a script proposed by professors.	05 <sup>(17)</sup>
Students use strategies and teaching methods that provide learning from reality and encourage the search for extra class sites to aid in the construction of knowledge through meaningful learning environments, providing them to exchange experiences with each other and with the teacher with other health professionals. On the first day of school an impact assessment is carried out in order to grasp what students bring “baggage” in relation to the topic.	06 <sup>(18)</sup>

Continues

Box 3 (cont.)

Nursing students performed technical visits to a Hospice of palliative care for children and their families in Northern Ireland. Before the visits the students were encouraged to prepare questions and express concerns about the module which involved visits. After the visit, the students held discussion to reflect about on-site service, exchanging experiences and clarifying questions related to the theory.	07 <sup>(19)</sup>
A graduate course in the palliative care area was offered to experienced nurses, who, from their experiences, analyzed clinical cases originating from their practices to develop mental models, identifying the problem, integrating knowledge, generating solutions and building arguments.	08 <sup>(20)</sup>
Graduate nursing students were divided into two groups. One group got the map on pathogenic microbes and another on genetics. Each member of the group built a single map without consultation. After the maps were classified into three types: lightning, chain and network. In the group that took the subject on pathogenic microbes students were divided into three groups, where each component had made a different map model, generating a heterogeneous group to create a consensus map. In the group on genetics, students were divided into trios, according to the vision of the kind of built map, forming a homogeneous group. The heterogeneous group was more collaborative and was more efficient to solve problems. Furthermore, the diversity allowed the presentation of meaningful learning experiences.	09 <sup>(21)</sup>
Nursing students were followed for two years to develop conceptual maps related to the concept of health. Students developed maps before the tutorials so that prior knowledge were identified during, encouraging discussions, and then demonstrating the consolidation of knowledge.	10 <sup>(22)</sup>

## DISCUSSION

The theory is little explored in the context of Nursing, although the term “meaningful learning” is found in many studies that explore the topic Education in Nursing<sup>(23-25)</sup>, only a few focus on the theory of Ausubel.

According to the Ausubel theory, meaning is a “phenomenological” product of the learning process in which the potential significance, inherent to the symbols, is converted to cognitive content and each individual uses a learning pattern and incorporate a symbol that is potentially significant in their cognitive structure<sup>(26)</sup>. However, research in other areas found that some teachers understand the adjective “meaningful” as something close to student’s interests and distort the true meaning assigned by Ausubel to his Theory<sup>(27-28)</sup>. Meaningful would not exactly be a subject that is important to the student. The student has to want to learn, however, the presentation of content should make sense in student’s cognitive structure, according to their ideas, previous experiences and intellectual maturity so that the new subject can actually make sense and be explained through their own words.

In addition, the term “meaningful” is not related to important or scientifically correct ideas, but the meaning that the

learner assigns certain knowledge and gives it importance according to its usefulness in their everyday life<sup>(29)</sup>. In this sense, he/she has to be willing to learn and the teacher’s role is to select potentially significant materials, that is, that make sense to the student with linking potential with previous knowledge<sup>(5)</sup>. The teacher has to touch the existing structure of the learner, awaken him/her for the incorporation of new ideas, with transformation and refinement of what was already known.

It is important that students are “initially placed in situations that arouse interest and require solving problems that act as learning triggers”<sup>(30)</sup>. Within the scope of Nursing, teaching and solving clinical cases with situations of everyday life arouse critical thinking of students with new experiences, favoring the use of the knowledge acquired, quickly and critically thinking and making decision. One of the studies came from clinical cases of nursing experiences in palliative care, so that, from what had been learned in the course, they could change the present or future care<sup>(20)</sup>.

According to the definition presented by some studies of the sample, the definition is consistent with what Ausubel proposed. Thus, learning is meaningful when new ideas<sup>(15)</sup> are anchored to pre-existing ideas (subsumer)<sup>(21)</sup> of non-arbitrary and substantive ways<sup>(13-14)</sup>. The link between this new knowledge requires students, who have an interest in learning<sup>(15)</sup>, to develop skills which will enable them to explain other situations of reality and transform their practice<sup>(19)</sup>.

Three studies<sup>(17-19)</sup> reported that for the occurrence of meaningful learning, the use of active methods are necessary. One study mentioned the importance of out-indulgence and mobilization, with individual and collective changes, so that the teacher may become a facilitator, with communication and observation skills, realizing the different moments of learning<sup>(17)</sup>; another study corroborated that teachers need to innovate in teaching strategy and assessment so that learning makes sense and can last for a lifetime<sup>(19)</sup>.

It is known that active methods stimulate the critical and reflective teaching and learning process in which the student critically reflects on the problem presented and, through research, identifying hypothetical solutions to the problem to perform actions of transformation, actively participating in the construction process of their knowledge<sup>(11)</sup>.

Some studies<sup>(11,17-18)</sup> show that active methodologies are contemplated within strategies that are based on a real or fictional problem, such as Problem-Based Learning (PBL) and the problematization methodology (PM). In PBL, the teacher presents a pre-prepared problem, and students study, individually and collectively, to solve the problem guided by a tutorial group. The PM goes from a real situation, in which students identify a problem of social reality, reflect on the causes, seek scientific knowledge and information to understand the empirical manifestations and the theoretical principles of the problem, formulate hypotheses and apply the presented and discussed solutions<sup>(11)</sup>.

Thus, both methods are important to mobilize students to participate in the knowledge construction process. However, meaningful learning requires the new content to rely on what the student already knows, this way he/she can challenge and advance in their own knowledge.

The active methods are very important to the construction of knowledge, but Ausubel<sup>(6)</sup> clarifies that learning can occur through reception or discovery, and that both actions can be developed in a meaningful or mechanical way. Thus, a traditional presentation, characterized by a receptive learning is not configured as a passive process of internalization because it can also occur in an active process of interaction with the concepts already acquired. Thus, the receptive meaningful learning is the human mechanism in excellence to acquire and store wide amounts of ideas and information in any field of knowledge<sup>(26)</sup>.

It is therefore up to teachers to provide a potentially significant material for the student and the task of discovering what combination of methodologies is most appropriate to the student's level and the content that will be addressed. It is noteworthy that it also emphasizes the need for the student to be an active learner, with broad participation in activities carried out, and with intention to learn. In this sense, Ausubel does not refer to the term 'active methods', but, in his discourse on the participation of the student, there is an understanding that they should be used at appropriate moments, as students are responsible for their learning.

Among the teaching strategies used, a few of them should be highlighted, according to the theory, such as the concept map and Gowin's Epistemological V. The introduction of concept maps occurred in 1984 with the publication of the book "Learning to learn" by Joseph D. Novak and D. Bob Gowin. The theoretical model of mapping was based on the Theory of Meaningful Learning, so that new information is linked to prior knowledge<sup>(31)</sup>.

A concept map is a graphical representation or organization diagram of knowledge, in which the main and significant idea is connected by lines or arrows to various concepts, showing the relationship between them<sup>(31)</sup>. The concept map was used as a teaching strategy in four studies<sup>(13-14,21-22)</sup>.

Gowin's Epistemological V, a heuristic tool developed by Gowin in 1981, was also based on the theory of meaningful learning. The instrument is a diagram in "V", whose left side is the conceptual theoretical domain of the knowledge production process, which is the thinking. At the base of the "V" is the description of events to be studied in order to answer the focus questions. The right side of the "V" is the methodological domain of knowledge production and means to do so<sup>(2)</sup>. One of the studies presented the construction of the Epistemological V based on a dissertation that used the Theory of Nursing Praxis Intervention in Public Health and assessed that this tool helps the training and the interpretation of any phenomenon articulated to production processes and social reproduction<sup>(16)</sup>.

Regarding the application of the Theory of Meaningful Learning, it was noted that only two studies<sup>(13-14)</sup> followed the framework for the application of the theory completely. Others used only some concepts of the theory, but did rigorous application.

Ausubel has not proposed a fixed model step by step to implement the application of the theory of meaningful learning. However, he has left many guidance on the basic requirements for it to happen. Scholars of this Theory, from its concepts and its structure, proposed a model to plan and implement it in teaching<sup>(2,26)</sup>.

Under this model, the first step would be to define the specific topic to be addressed. At this stage, one must identify the

concepts and hierarchical relationships between them, to sequence the content, starting from general to specific, with potentially significant organization. These hierarchical relations are guided by the principle of progressive differentiation, in which the most general ideas and more inclusive discipline must be submitted in the beginning<sup>(2,26)</sup>. No study of the sample emphasized this principle, but one allowed the student to choose the topic of his/her interest<sup>(20)</sup>.

In the second step, situations for the student should be created/proposed, so the teacher can lead the student to externalize their prior knowledge through discussion, questionnaire, concept maps, the problem-situation or other methods that encourages the participation of the student. Four studies<sup>(13-14,20-21)</sup> took into account the principle of revealing what the learner already knows, that Ausubel considers the single most important factor so that learning is set<sup>(6)</sup>. In Nursing, finding out what the student already knows facilitates the teaching, so that the teacher will develop increasing levels of a more complex care, especially when the content to be addressed involves the care of the sick or disease prevention, which requires the understanding of the pathophysiology, for example.

The third step of the model is to propose initial problem situations at the introductory level. From the previous knowledge of the student, identified in the previous step, problem-situations must be proposed to prepare the learner for the introduction of knowledge, which can function as previous organizer, an introductory material that serves as a bridge between what the learner already knows and what he/she needs to know so they can learn the new material significantly. At this point the teacher can use computer simulations, demos, videos, or clinical cases, for example.

The proposition of bringing the problem-situation was evident in one study<sup>(15)</sup> which highlighted the importance of causing cognitive conflict in students that led them to embark on a personal quest to solve problems. In another study<sup>(17)</sup>, students sought problem-solving situations related to the theme that would be studied in order to help them understand the work in health and nursing. Another study used a field visit<sup>(19)</sup> so that the student could reflect on the care that was being provided in practice and then relate the theory. Other research proposed clinical cases of his own experience of the student<sup>(20)</sup>. Thus, we see the importance of proposing problems that arouse in the student interest in the subject.

The fourth step is the presentation of knowledge that should be taught and learned, considering the principle of progressive differentiation, in which ideas and concepts more general and more specific discipline must be submitted at the beginning to gradually be differentiated. The unit material uses the organizers to provide an anchor before the learner is faced with a new material.

As meaningful learning is happening, new concepts are assimilated, prepared, developed and differentiated in the cognitive structure of the learner and this process occurs through the progressive differentiation and integrative reconciliation<sup>(5)</sup>.

In the fifth step, the teacher should continue the presentation of knowledge, with a more complex level, new examples, and promoting an integrative reconciliation highlighting the similarities and differences from the examples and situations

already worked. It must be noted that the theory does not propose a limit for the presentation of knowledge. Therefore, it is understood that this step can be repeated, since it depends on the extent of the syllabus for each subject, the resources used by the teacher and meaningful learning of the learner. This step was perceived in two studies<sup>(13-14)</sup>.

In the sixth step, the completion of the unit occurs, when to continue the process of progressive differentiation and integrative reconciliation through another presentation or reading text or other resource, so that students can again, in small groups, develop collaborative activities, presenting and discussing them with the class. This step was found in four studies<sup>(15,17,19-20)</sup>.

In the seventh step, the assessment takes place. To Ausubel, the best way to assess whether learning was meaningful is to propose to the learner a new situation, unfamiliar situation, requiring maximum transformation of the knowledge gained. For another scholar of this theory<sup>(2)</sup>, the time of the assessment is not appropriate to new situations, but they happen continuously throughout the implementation process and, after completion, perform a summative activity with questions involving reflection and understanding of student. In his critical view, plus the Ausubel's theory, he brings to the reflection that the student is a perceiver from what is taught and the error by learning is a natural process of human learning, but unfortunately at school, mistakes are punished.

In this aspect of the assessment, some studies have used the conceptual map as a tool to check prior knowledge of the learner and identify the changes of new content and the relationship between them<sup>(21-22)</sup>. The concept map is useful for teaching, assessment and learn, but it must be assessed qualitatively to interpret the information given by the student in order to get meaningful learning of evidence<sup>(2)</sup>.

For Nursing, the assessment based on real situations as clinical cases and simulations enriches the process of teaching and learning because enables a more close-to-real situation cases, as students would behave in front of the patient and the appropriate time to the teacher intervene in the knowledge transformation. Ausubel<sup>(6)</sup> adds that the natural history of meaningful learning does not end with the acquisition of new meanings, but it is always followed by retention or forgetfulness, making up own results and natural consequences, because everything you learn can be retained or forgotten.

Meaningful learning requires conditions for this complexity and totality of the cultural and social being in their manifestations in physical, affective and cognitive languages. It involves understanding that learning occurs individually for each person, and related to relationships of the person, who learns

from the object of knowledge in each specific situation and in the interaction subject-learner with subject-teacher in a cultural and social context to which they belong<sup>(9)</sup>.

In nursing, a dissociation of the teacher to technicality is a necessity, bringing them to the field of human sensitivity, where the perceptual experience of being with the other makes the student able to reflect, to relate, to understand and approach the being cared, transforming the learning spaces for meaningful experiences<sup>(25)</sup>.

Other researches can be performed in other areas of knowledge such as education, psychology and physics, which have applied the theory in the classroom, in teaching simple and complex topics in order to compare how education becomes meaningful in these areas and in nursing education. These findings may provide new methodologies and strengthen the dissemination of this theory in health.

## FINAL CONSIDERATIONS

This study aimed to provide a synthesis of scientific literature production involving the Theory of Meaningful Learning in the process of teaching and learning in the context of nursing. Among the few studies that addressed the topic, only some were related to meaningful learning from the theory of David Ausubel.

Overall, there were many difficulties to find studies that worked directly with the theory under the Nursing scope and to identify aspects that support its application. Concomitant to this, the step by step development of the teaching and learning process was feasible only when other scholars developed the application of the Theory. Only two studies applied the theory in its entirety, the others cited Ausubel or the term "meaningful learning". From the total of ten studies, six have brought the definition of the term.

Few studies reported that teachers are concerned with the use of active methodologies for the learner to become responsible for their knowledge. This aspect is very important because Ausubel emphasizes the importance of students' desire to learn, as active methodologies favor greater involvement with their learning. Thus, there is long way to go, not only in the way of work content, but also of how to assess if learning was really meaningful.

The scope of meaningful learning requires the breaking of the dichotomy between theory and practice and to promote the articulation of contents with action, considering the student as the author of her/his own knowledge, since Nursing needs professionals who know how to take care of another human being with knowledge, ethics, commitment, love and responsibility. This is the biggest challenge for professors.

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