

# Assessment of an educational intervention based on constructivism in nursing students from a Mexican public university

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## Assessment of an educational intervention based on constructivism in nursing students from a Mexican public university

**Objective.** This work sought to evaluate the effect of an educational intervention centered on the analysis of clinical cases to inquire on conceptual learning in students on the theme of nursing care of women with complicated puerperium. **Methodology.** This was a quasi-experimental study with before and after evaluation. Two groups of students participated from the eighth semester of the nursing program, which professionalized individuals who were already nursing technicians: the study group (n = 33) was taught the theme of nursing care to women with complicated puerperium with the case analysis technique and the control group (n = 27) received traditional teaching. A self-applied question here was used related to the thematic unit, which included three clinical cases and the resolution of a total of 37 questions related to set cases. This questionnaire was the same applied before and after the intervention. **Results.** The pre-intervention mean score was similar in both groups (26 during the study and 27 during the intervention). Upon completing the educational intervention, the post-intervention scores were equal in both groups (27 points). The intra-group analysis showed that in the study group the intervention produced a slight change in conceptual learning, which was statistically significant. During the *post-hoc* analysis differences in scores were found in students who worked in hospitals with tier three level of care. **Conclusion.** Educational intervention favored conceptual learning slightly in the study group. It is necessary to explore other intervening variables that propitiate this learning in the program.

**Key words:** control groups; learning; postpartum period; research design; nursing students.

## Evaluación de una intervención educativa basada en el constructivismo en alumnas de enfermería de una universidad pública mexicana

**Objetivo.** Evaluar el efecto de una intervención educativa centrada en el análisis de casos clínicos para indagar el aprendizaje

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conceptual en la temática cuidados de Enfermería a las mujeres con puerperio complicado. **Metodología.** Estudio cuasiexperimental con evaluación antes y después. Participaron dos grupos de estudiantes de octavo semestre del programa de Licenciatura en Enfermería que profesionalizaba personas quienes ya eran técnicas en enfermería: al grupo de estudio (n=33) se le enseñó la temática de cuidados de Enfermería a las mujeres con puerperio complicado con la técnica de análisis de casos; al grupo control (n=27), con enseñanza tradicional. Se utilizó un cuestionario autoaplicado relacionado con la unidad temática, en el cual se incluyeron tres casos clínicos y la resolución de un total de 37 preguntas relacionadas con los mismos. Se aplicó el mismo cuestionario antes y después de la intervención. **Resultados.** El puntaje promedio preintervención fue similar en los dos grupos (26, en el de estudio; 27, en el de intervención). Los puntajes postintervención fueron iguales en ambos grupos (27 puntos), una vez realizada la intervención educativa. El análisis intragrupos mostró que en el grupo de estudio, la intervención produjo un ligero cambio en el aprendizaje conceptual, que fue estadísticamente significativo. En el análisis post-hoc se encontró diferencia en el puntaje en los alumnos que trabajaban en hospitales de tercer nivel de atención. **Conclusión.** La intervención educativa favoreció ligeramente el aprendizaje conceptual en el grupo de estudio. Es necesario explorar otras variables intervinientes que propicien este aprendizaje en el programa.

**Palabras claves:** grupos control; aprendizaje; periodo posparto; proyectos de investigación; estudiantes de enfermería.

### **Avaliação de uma intervenção educativa baseada no construtivismo em alunas de enfermagem de uma universidade pública mexicana**

**Objetivo.** Avaliar o efeito de uma intervenção educativa centrada na análise de casos clínicos para indagar a aprendizagem conceitual em estudantes na temática cuidados de Enfermagem às mulheres com puerpério complicado. **Metodologia.** Estudo quase experimental com avaliação antes e depois. Participaram dois grupos de estudantes de oitavo semestre do programa de Licenciatura em Enfermagem que profissionalizava pessoas que já eram técnicas em enfermagem: ao grupo de estudo (n=33) se lhe ensinou a temática de cuidados de Enfermagem às mulheres com puerpério complicado com a técnica de análise de casos e ao grupo controle (n=27) com ensino tradicional. Utilizou-se um questionário auto-aplicado relacionado à unidade temática, o no qual se incluíram três casos clínicos e a resolução de um total de 37 perguntas relacionadas com os mesmos. Este questionário foi o mesmo que se aplicou antes e depois da intervenção. **Resultados.** A pontuação média pré-intervenção foi similar nos dois grupos (26 no de estudo e 27 no de intervenção). Uma vez realizada a intervenção educativa, as pontuações pós-intervenção foram iguais em ambos grupos (27 pontos). A análise intragrupos mostrou que no grupo de estudo, a intervenção produziu uma ligeira mudança na aprendizagem conceitual, que foi estatisticamente significativo. Na análise pós-hoc se encontrou diferença na pontuação nos alunos que trabalhavam em hospitais de terceiro nível de atendimento. **Conclusão.** A intervenção educativa favoreceu ligeiramente a aprendizagem conceitual no grupo de estudo. É necessário explorar outras variáveis intervinientes que propiciem esta aprendizagem no programa.

**Palavras chave:** grupos controle; aprendizagem; período pós-parto; projetos de pesquisa estudantes de enfermagem.

## Introduction

Over the years questions have emerged on the teaching method that has prevailed in Nursing: the traditional education method in which students are assigned a passive role where knowledge from

the professors is deposited; this occurred until late 20<sup>th</sup> century, given that the aim was to accumulate knowledge from the personal meaning in the teaching-learning processes.<sup>1</sup> Pedagogic models

like the constructivist model, which emphasize that it is the individual who constructs his or her own learning, become relevant upon the new proposals, are based on the fact that all learning depends on construction processes by each individual, in the encounters and adjustments established with their environment, so that knowledge is the result of their perceptions and prior experiences.<sup>2</sup> Universities are responsible for training students to reflect and to offer solutions upon uncertain situations of the practice and to respond to the population regarding their health needs and to nursing as a profession. Thus, when looking for background studies to support the research problem, investigations were found that evaluate the effectiveness of educational interventions in different academic levels of which some are related to problem solving,<sup>3</sup> development of clinical aptitudes,<sup>4</sup> fostering participation, and accomplishing conceptual learning.<sup>5</sup> Although all of these showed their effectiveness, they suggest that didactic strategies should be promoted to favor constructive learning of students, given that it permits greater abilities and learning.<sup>3</sup>

Based on the aforementioned, it is necessary to inquire on the knowledge resulting from the construction of learning by students from the Open University System (SUA, for the term in Spanish), that is, it is fitting to know if conceptual change occurs and how it occurs in different areas of knowledge, given that research conducted on conceptual change has been mainly aimed that the scientific-natural areas<sup>5</sup> and little of it in other areas like the humanities, which is why knowing the result of conceptual learning in nursing is transcendental. Conceptual learning is defined as the “capacity to interpret the physical world by using concepts, models, and theories of science”.<sup>2</sup> Currently, progress is underway in the development of the field of knowledge appertaining to nursing: “every discipline must have field of knowledge ordered in such a way that it has global significance, scientific methodology, and a scientific language that organizes the very knowledge”.<sup>1</sup> Thereby, it turns out interesting to evaluate the achievement of conceptual learning in nursing students. Also, the analysis of clinical

cases is a didactic strategy, which consists in presenting a clinical case to a group of students for its discussion; they are invited to examine important data, undertake literature searches that allow them to have a theoretical orientation and, lastly, adopt that which they consider the best decision. It is a learning strategy that enhances the analysis, inference, decision-making, as well as the reflection, given that it prepares students to think through the reciprocal action of individual attempts aimed at arriving at a decision.<sup>2</sup>

It must be indicated that although the students from the SUA had a prior work experience in the health sector, and have practiced nursing for at least two years, with a mean working experience of 12.5 to 16 years,<sup>3</sup> unfortunately, through a practice that emphasizes procedural abilities and skills, but with little conceptual support for reflexive actions. Due to this, it is important to ask if an educational intervention based on active participation of the students on their learning favored the conceptual learning of nursing care. Besides, they present a broad variation on the time since having left formal education, which is why their knowledge may derive from a routine view of the phenomena and of caring for them; this is why the need arises to emphasize on the necessity to reconstruct learning through professors implementing strategies that help students to construct and reconstruct their learning, to respond to the needs for care demanded by the people whom they care for during their professional practice.<sup>6</sup>

Thus, the purpose of this research was to assess through a quasi-experimental design the effect of an educational intervention centered on the strategy of analyzing clinical cases and applying the process of nursing care, which was expected to promote a higher level of conceptual learning in the students from the Nursing and Obstetrics degree program at SUA-ENEO.

## Methodology

This research has a quantitative approach and the design was prolective, quasi-experimental,

with explicative scope; an educational strategy was used to intervene from a constructivist perspective, using the case-analysis method, which also implies using the Nursing care process to observe resulting effects in the conceptual learning of nursing students, which as indicated previously, is defined as the “capacity to interpret the physical world by using concepts, models, and theories of science”.<sup>2</sup>

The research was carried out by comparing two groups of 30 students each, which were enrolled in the Nursing and Obstetrics degree program admitted during the years after the first of the SUA at Mexico’s Universidad Nacional Autónoma, during the eighth semester in the 2009-2 school cycle. Given that this was a quasi-experimental design, to achieve greater internal validity to groups were randomly selected from five natural groups that were already comprised in branches of the metropolitan area, through raffle, and “pre-test-post-test design and control group” were used;<sup>7</sup> selection of the intervention group and control group were also carried out randomly.

Prior to conducting the research, both groups were informed of the purpose of the study and written informed consent was signed by the participants. The pre-test and post-test was applied in both groups under similar conditions, and consisted in a questionnaire with a section of sociodemographic data and a written exam to evaluate conceptual learning through a self-application questionnaire related to a thematic unit “nursing care of women during complicated puerperium” with the application of the methodology of the nursing care process; with the intervention group the study worked the strategy of method of analysis of clinical cases, carried out during two weeks; with the control group there was traditional teaching. The instrument included three clinical cases elaborated *ex profeso* for their analysis and resolution with a total of 37 questions with multiple choice answers; the questions evaluated learning of concepts related to nursing care during puerperium complications, following the stages of the Nursing care process with items with multiple choice answers; answers were coded

as: 0 = incorrect, 1 = correct, and 2 = “do not know”; the third option was scored as incorrect. Each question had a value of one point, which is why the maximum possible score was 37, equivalent to a score of 10; hence, the passing score to consider that learning took place is from 23 to 37 points, that is, a higher score represents conceptual learning accomplished; it is worth mentioning that the post-test was applied three weeks after the educational intervention.

Although what was sought was to solve clinical cases, which implied bringing into play cognitive abilities of evaluation, discrimination, diagnostic reasoning, and decision making, the score referred implied conceptual learning. Cronbach’s alpha was applied to the instrument, obtaining a coefficient of 0.65. A descriptive analysis was performed for the sociodemographic variables and an analysis through inferential statistics by applying Student’s t for related samples to evaluate the changes within each group and a Student’s t for independent samples to compare if a higher level of conceptual learning existed in contrast with the control group.

Through the ANOVA test of repeated measurements, the study evaluated if an effect of the intervention existed, comparing by group, by measurement made, and the interaction before and after the intervention. An ANOVA was performed to evaluate if a difference existed between the conceptual learning obtained during the post-test, according to: the number of familiar functions performed by the students, their marital status, type of studies carried out before being in the Nursing and Obstetrics degree program, the level of care of the institution in which they worked, and the professional function fulfilled.

## Results

The research studied 60 students from the Nursing and Obstetrics degree program in the SUA, 33 in the study group and 27 in the control group, all working in the healthcare sector. At the beginning

of the study, the groups had 35 and 30 students, respectively: however, there was experimental mortality in both groups. Table 1 illustrates the sample characterization.

Given that they were students from the Open System, it is noted that ages in both groups were similar, the mean age in the study group was 40

± 6.7 years and in the control group it was 39 ± 8.6 years. Regarding the marital status of the participants, it was found that in both groups the highest percentage was married (63% from the control group and 42.4% from the intervention group). The groups were similar in number of years of study, time in nursing practice, and time of experience in the maternal infant area.

**Table 1.** Characterization of the study groups

Variable	Intervention group (n=33)	Control group (n=27)	p-value
Age; mean ± SD (min-max)	40±7 (28-52)	39±9	0.631*
Female sex; %	93.9%	96.3%	0.999†
Marital status; %			
Single	39.4%	25.9%	<0.001†
Married	42.4%	63.0%	
Divorced	15.2%	7.4%	
Widower	3.0%	3.7%	
Years of study; average ± SD (min-max)	6±2 (3-11)	5±2(3-10)	0.102*
Years in nursing practice; average ± SD (min-max)	19±6 (8-32)	17±7(7-31)	0.355*
Years of maternal-infant experience; average ± SD (min-max)	8±8 (1-22)	8±7(1-24)	0.874*

(\*) Student t for independent groups; (†)Chi<sup>2</sup>

Regarding the pre-test and post-test scores obtained, it can be noted in Table 2 that the score of the intervention group had a one-point difference

between both moments of evaluation, while the control group showed no change, with the first being the statistically significant difference.

**Table 2.** Average score values of the instrument and intra-group differences according to the moment of evaluation

Group	Evaluation	Mean ± DS	Minimum	Maximum	Intra-group Difference	p of the intra-group difference
Intervention	Initial	26±5	15	34	1	0.027
	Final	27±4	17	35		
Control	Initial	27±3	20	33	0	0.711
	Final	27±5	17	35		

Table 3 shows that there was no statistically significant difference between the groups during the initial or final evaluation.

Upon evaluating if a linear relationship existed between the score and the study group by using ANOVA for repeated measurements, it was verified

that the intervention had no significant effect ( $p = 0.077$ ). It is observed that a linear tendency exists between the total post-intervention score

and the level of healthcare in which the student works, being  $23 \pm 5$  in the first,  $27 \pm 5$  in the second, and  $29 \pm 3$  in the third ( $p = 0.043$ ).

**Table 3.** Difference of score means of the instrument between groups according to the moment of evaluation

Evaluation	Difference between groups	$p$ of the inter-group difference
Initial	-1	0.051
Final	0	0.975

## Discussion

This study inquired on the conceptual learning achieved by students in the Nursing and Obstetrics degree program at SUA when they learned nursing care of women enduring puerperium with complications, from the intervention with a strategy based on analysis of clinical cases, based on the theoretical perspective of constructivism, which is of vital importance it permitted evidencing conceptual learning and, consequently, offer the necessary care according to the individual situations arising during the real practice. The strategy of the clinical case analysis method permits students to depart from the knowledge they already have and confronts them with situations in which they must be resolute, triggers them to place into play metacognitive strategies to solve the situation being presented and, in turn, permits their interaction with their peers to solve those situations favoring for learning to be significant. The results show that the educational intervention centered on the case analysis method favored conceptual learning within the group with intervention, a situation agreeing with that found by Castellanos,<sup>8</sup> Blanco<sup>9</sup>, and Betancourt;<sup>10</sup> however, upon comparing between groups if the educational intervention, in contrast with habitual teaching, propitiated higher learning, no significant evidence was found, although it must be considered that the control group had a higher pre-test score than the intervention group, that is, that of the control simply did not change, while that of the study began lower and improved somewhat, a significant effect of the educational

intervention also did not exist when comparing group, measurement, and interaction.

The aforementioned is explained because cognitive conflicts do not always produce conceptual change and, besides, erroneous concepts are rarely replaced, even co-existing with new concepts. In agreement with this, it is suggested for teaching not to point to the immediate radical restructuring of existing knowledge, but to a gradual reinterpretation in the conceptual change. Due to this, the aim is not at immediate change because conceptual change is a complex modification with intervention from diverse processes, like cognitive, epistemological, and instructional. In this sense, emphasis is made on its instruction models not being unidimensional; that is, to favor the construction of knowledge, diverse teaching strategies should be sought according to what is to be propitiated in students to develop their capacity to argue, explain, and restructure according to scientific knowledge.

Although this study conducted the strategy of analysis of clinical cases, when students learned nursing care during puerperium with complications, as central instructional strategy, the pertinence is noted of simultaneously using other instructional strategies like the elaboration of questions by students, from the clinical situations encountered during the practice, which could modify the results. Additionally, upon inquiring and responding to if differences existed

in the conceptual learning of nursing students at the SUA, according to the variables: number of functions performed, marital status, type of studies carried out, if they worked in a single institution, level of care in which they worked, if they had a scholarship and what type, the type of professional function performed, having experience in the maternal infant area, or having taken the PAE course; it was found that differences only existed by level of healthcare in which the nursing students work and their conceptual learning, as shown in the results. However, indications do exist in that the professional function performed acts as intervening variable, given that the intervention group performed in lesser percentage in the care area and more in the administrative area, in relation to the group without intervention.

That is, there were significant differences according to the level of healthcare in which they worked, with students working in third level care showing the highest levels of conceptual learning; this may be because at that level of care complex health problems emerge, against those to which students must respond with nursing care in complicated situations, which agrees with the result of this study that evaluated the conceptual learning achieved by students upon conducting nursing care during puerperium with complications.

Thus, we may think that the stable concepts of students who work in a tier three level of care are related to their opportunity to apply them continuously, in the solution of diverse complex situations during their daily practice, of which this study provides evidence. As indicated by Mejía,<sup>11</sup> theory validated in practice systematically develops disciplinary empirical knowledge and provides knowledge and comprehension to reinforce it. That is, students whose field of work confronts them to the practice of caring for people in complex health situations (on some occasions emergency) face the need to solve problems similar to the clinical cases presented in this study, showing with this that practice reinforces conceptual learning.

Some limitations of the study that must be considered for later studies are: the period

transpired between the pre-test and the post-test was relatively short, three weeks after the intervention to reduce the problem of repetition or rote memorization,<sup>12</sup> which could have intervened as confounding variable to measure conceptual change, given that as mentioned said change is a complex and gradual situation that does not take place immediately; likewise, the educational intervention and assessment of the conceptual change were applied only on one thematic unit of the program and not on the complete program. Another limitation was the fact of evaluating conceptual learning only from the quantitative point of view, given that it does not permit evidencing qualitative aspects implied in the conceptual change, which is why it could be of interest to analyze the discourse of the students and their evaluation of the gradual achievements in conceptual learning.

The conclusion of this study is that the intervention strategy with the methodology of analysis of clinical cases favored conceptual learning when nursing care is carried out through the nursing care process. With respect to differences found in the conceptual learning of nursing students from the SUA; differences were found only in the variable level of care worked in, specifically in students working in tier three level of healthcare.

The implications of the study for Nursing education and practice for nursing students from SUA, who are nurses already working in the healthcare sector and who attend the university in search of a professionalization option; looking for strategies that accomplish a true conceptual change in them is an ethical obligation, given that beyond badging, a professional transformation is sought through conceptual learning, which transcends technical rationality and which implies methodologies of problem resolution. Due to that, strategies like those used during the educational intervention designed for this study like the resolution of clinical cases and emphasis on planning, development, and evaluation of the educational intervention are paths to accomplish it. Also, in the study programs, besides caring for their structure, it must be shown through what

learning activities will the theoretical perspective of constructivism be manifested, so that it does not merely appear as formal curriculum, but also as experienced curriculum. This will undoubtedly enable changes in the nursing practice and will allow showing evidence of the importance of having access to professionalization options as a guarantee of improvement in caring for people.

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