Effectiveness analysis of the implementation of the strategy of Simulation in Education according to the perception of the facilitators involved in the process as of the second quarter of 2016

Rocío Boza Calvo
rboza@uh.ac.cr
Facultad de Educación
Universidad Hispanoamericana

Sharon Solano Mena
Sharon.solano@uh.ac.cr
Facultad de Educación
Universidad Hispanoamericana

ABSTRACT

The idea of practice makes perfect is underlined in this article. Simulation is a didactic strategy that enables the approach to the professional reality. Specifically, this research examines the formal process of the implementation and formal evaluation of an innovative educative experience in the university scope based in the simulation in the Faculty of Education at Universidad Hispanoamericana – Costa Rica. The objective of this research is to prove the effectiveness of simulation as a methodological strategy used in several courses in the curriculum of the Faculty of Education at Universidad Hispanoamericana. To do that, each professor of those courses chooses thematic contents that have been studied in the classroom and plans, in accompaniment with professional actors, a scenario, also called profile, which resembles as close as possible the educative reality in classroom or learning centers contexts, with the objective of making the student face those situations and practice the theoretical knowledge acquired in the courses. Results show how simulation takes the student to assume a role of teacher; besides that, that role evidences the development of social, personal, and professional competences and skills. The study concludes that simulation is effective as a methodological strategy in college studies of teachers' development, and that it is itself, an experience of educative innovation.

Keywords: Simulation, teaching person, methodology, student body

Análisis de efectividad de la implementación de la estrategia de Simulación en Educación según la percepción de los facilitadores involucrados en el proceso al segundo trimestre de 2016

RESUMEN

En este artículo subyace la idea de que la práctica hace al maestro, la simulación es una estrategia didáctica que permite el acercamiento a la realidad profesional. En concreto, esta investigación recoge el proceso de implementación y evaluación formal de una experiencia educativa innovadora en el ámbito universitario, basada en la simulación específicamente en la Facultad de Educación de la Universidad Hispanoamericana – Costa Rica. El objetivo de la investigación es demostrar la eficacia de la simulación como estrategia metodológica utilizada en diferentes cursos de la malla curricular de la Facultad de Educación de la Universidad Hispanoamericana. Para ello cada profesor en su curso escoge contenidos temáticos que han sido abordados en el salón de clase y planifica con el acompañamiento de actores profesionales un escenario o también llamado perfil que se acerca lo más posible a la realidad educativa en contextos de aula o centros educativos, con el objetivo de que el estudiante se enfrente a esas situaciones y ponga en práctica los conocimientos teóricos adquiridos en los cursos.   En los resultados se observa cómo la simulación lleva al estudiantado a asumir el papel de docente; además, en su rol de profesor pone en evidencia el desarrollo de competencias y habilidades sociales, personales y profesionales. El estudio concluye, por lo tanto, que la simulación resulta eficaz como estrategia metodológica en los estudios universitarios de formación docente y que constituye en sí misma, una experiencia de innovación educativa.

Palabras clave: Simulación, personal docente, metodología, estudiantado.

INTRODUCTION

Simulation in Education as a Methodological Strategy at University Level

Simulation in education is a new strategy that shows some aspects of the real world by imitation or replication. It is based on a real-world system or phenomena in which some elements are simplified or omitted to make learning easier. In other words, simulation involves a process: the design of a model that constitutes a clipping of a real system to carry out experiences with it, in order to recognize, comprehend, (self) evaluate, modify strategies and acquire others. From the educative point of view, the importance of simulations resides in making the user participate in an experience that is essential for the development of habits, skills, mental schemes, among others, that can influence their behavior.

Simulation and learning are two united concepts within the educational process. Simulations create an interactive learning environment, allowing students to explore the dynamics of a process. It has numerous advantages as a study support tool: it favors learning by discovery; it makes the student demonstrate what has been learned; it makes the student execute independently; the experience can be reproduced a high number of times with the same control of variables; it allows the student to react as he or she would do it in the professional world; it encourages creativity; it saves time and money; it promotes individualized teaching; and it facilitates self-evaluation (Salas and Ardanza, 1995; Mason and Rennie, 2006; Ruiz, 2008).

Nowadays, the educational paradigm is centered on the student body, and, for learning to be effective, meaningful, and functional, higher education institutions have been required to renew teaching methodologies that have been traditional for decades, to modify them for other innovative ones, within which is the simulation. This innovative methodology is used to replace or expand real experiences through guided experiences that evoke or replicate substantial aspects of the real world, in a fully interactive way.

But in order to achieve the above, we now focus on the achievement of student competencies, taking as reference the four basic pillars of knowledge: learn to know, learn to do, learn to live together, learn to be.

A competence is a complex "know-how", which is manifested in the effective action on a problematic situation. Different skills, knowledge, and attitudes work together in an integrated way to find the solution of it (Camargo-Escobar and Pardo-Adames, 2008;

Díaz-Barriga, 2005; Rodríguez, 2007; Yaniz and Villardón, 2006). Generic or transversal competences refer to the development of people, both in their intrapersonal dimension and in interaction with others (Ramírez and Medina, 2008). The specific competencies reflect the performance of each profession (Hawes and Corvalán, 2005).

Traditionally, the training given in universities has been characterized by the transmission of knowledge, based on a professional profile. The degree obtained certifies that a graduate can practice, if the person wishes, a profession. Without discussion, excellent professionals have been trained; they have had access jobs and have developed efficiently and successfully; however, recent research affirms that given the social, economic, and motivational changes in today's world, this is not enough. In other words, employers and users of public services demand another series of skills, which apparently were not acquired during university studies. Garcia (2006).

It is here where simulation becomes one of those innovative changes, which have had to be implemented to satisfy these new demands of the professional in training.

In regards to the concept of simulation, Gough y Whitehall (1962) cited by Zuriñe Gaintza (2020) define it as the process of designing a model of a real system and developing experiences with the objective of comprehending the behavior of the system elements. Hence, creating a simulated environment generates learning about real situations that in the future, a professional in various fields, must face. Subsequently, it was shown that in the university environment, simulation constitutes an effective and active methodological tool that enhances interest, increases motivation and facilitates the development of skills (Fernández March, 2006), cited by Zuriñe Gaintza (2020).

Hence, it is convenient to know what the term educational simulation refers to, from the perspective of its application at the higher level of education. López and Chaves (2013) define simulation as the representation in the teaching process of a social situation. Although the students "play" a role, it is not a game because they are simulating a situation (although imaginary) that can occur anywhere. Even though it is a simulated case, it is based on reality.

This is a very clear definition of what simulation is, and it specifically delimits it. Therefore, it shows the difference between this and a role play or a dramatization; concepts that are often confused with simulation.

Once again, it should be known that simulation is based on realities that are brought into the university classroom, so that those situations become the most experiential experience possible. The participation of professional actors is an essential component to achieve this.

In regard to this, Salas and Ardanza (1995) state that simulation consists of placing a student in a context that imitates some aspect of reality, and in establishing in that environment situations, problematic or reproductive, similar to those that the student must face in the future.

That is the main objective of simulation. In the beginning, simulation appears as an exclusive methodology of careers in the medical field. Today it is known that in other careers this methodology is also successful and fulfills the same objective. One of them is the Faculty of Education of the Universidad Hispanoamericana, which has ventured into this field.

This article shows a qualitative study in the second quarter of 2016 at Universidad Hispanoamericana, a university which has implemented a formal simulation in education in six of the courses in the curriculum of different majors in the Faculty of Education. The courses are

- Learning Problems
- Language Disorders I
- Group Techniques
- Evaluation Techniques in English and Spanish
- General Didactics I
- English Teaching III

Almost two years after its implementation, it was considered pertinent to carry out an analysis of its effectiveness according to the perception of the facilitators who have participated in it throughout this time.

A total of 18 professors from the three university campuses (Llorente, Puntarenas, and Heredia) participated in this process.

From the second semester of 2016 to 2021, simulation has been a learning strategy used in six of the courses of the Faculty of Education at Universidad Hispanoamericana. The foregoing is based on the fact that alternatives of active methodologies and current strategies must be sought every day in order to provide an updated teaching and learning

process in accordance with the demands of today's society in terms of the training of professionals in the field of Education. This is why, simulation is applied in education as a way to stimulate the creative and independent attitude of the students of the Education majors, which can be conceived as a new type of teaching, as a system of principles, or as a set of teaching methods.

Simulation consists in placing students in a context that imitates any aspect of reality, establishing situations, problematic or reproductive, similar to those that they must face in their pedagogical practice. The use of simulation in the educational processes of Education constitutes an effective teaching and learning method to achieve in our students the development of a set of skills that will lead to superior modes of action.

The use of simulation accelerates the learning process and contributes to raising its quality. It cannot constitute an isolated element of the teaching process, but an integrating, systemic, and orderly factor of the process. Its use must have a logical concatenation within the course program.

In each of the courses that have simulation as a teaching methodology, simulation is presented in the program, and it is worth 20% of the final grade of course approval. In addition, throughout the semester, as of week 7, according to the course schedule, two simulations must be carried out. Eighteen teachers have been trained and have become the facilitators of the process.

At the beginning, the Simulation Center was located at the Aranjuez site on the third floor of the building. It had one set aside for the execution of simulation scenarios and a control room or Gessel to carry out the debriefing or analysis of what happened in the simulation. Then, it was considered that the simulation would be carried out at each site using Skype. Simulation is an educational methodology where people learn through models, actors, or virtual reality. It is taken as one more educational methodology within those used in teaching processes. This methodology is based on other methodologies applied in experiential and meaningful learning.

Some forms of simulation have already been used in education. For example, learning about the body through anatomical models, the use of computer programs, virtual reality and augmented games are cited to give students the opportunity to be direct participants in their learning.

Role playing is perhaps the technique used in the classrooms that resembles the simulation used in the Faculty of Education.

This methodology is created from studies carried out in flight simulators, sophisticated training equipment that allows the user to recognize the mistakes made and the consequences thereof.

At the educational level, participants are expected to develop scenarios similar to those they might face in daily life in their work areas, so their learning includes the teaching moments offered by the mistake made.

Simulation is conceived as a comprehensive and meaningful learning in which the variation of the complexity of the situations, opportunities for practice, repetition of procedures are repeated as many times as necessary.

The competences that this methodology develops in education can be summarized as

- Competences and reasoning for the resolution of situations
- Teamwork
- Learning from experience and mistakes
- Feedback

The Simulation Center at Universidad Hispanoamericana has a mission based on providing a pedagogical innovation strategy in the comprehensive training of professionals with human quality that respond positively to the diversity of educational environments similar to those that must be faced in the professional field, achieving leadership in the area of university education. The vision is to be a leading institution in Simulation in Education at a national and international level, with innovative programs, maintaining seriousness and prestige in all areas of performance.

One of the steps that must be carried out to work this methodology in the area of university education is to establish the steps that will be followed by the teacher in charge of the course and the simulation teacher coordinator, for the selection of the appropriate simulation type and the fulfillment of the learning objectives of the courses that will use this didactic strategy. Each simulation has a level of complexity that refers to the degree of difficulty that is introduced to the scenario according to the expected cognitive development in the participants and to the level where they are. The other level is fidelity or degree of realism according to the environment to be represented, by adding furniture,

equipment, clothing and other accessories used in educational contexts. Within this fidelity, the following can be defined

High fidelity: Simulations are carried out in an integrated setting that allows the development of skills in situations where external actors are going to be used, and who will represent disruptive behaviors of both the student population, teaching staff, administrative staff or parents of family.

Medium fidelity: Simulations in which actors intervene in situations that occur in the educational center, but where the situation to be represented does not imply crisis situations in the students, parents and teachers, the person in charge of the management of the educational center, or other professionals.

Low fidelity: This type of modality uses the workshop technique through which the student of the Universidad Hispanoamericana prepares and / or participates in workshops, simulating the application of these in educational contexts with: other teachers, parents, or the educational community in general.

The simulation teaching coordinator and the teacher in charge of the course must select the degree of complexity and fidelity of the scenarios to meet the learning objectives and achieve the competencies in the student.

The simulation teaching coordinator and the professor in charge of the course must identify the degree of fidelity (high, medium and low) according to the expected performance of the student from the objectives and contents selected from the course program, in a particular or integrated way, and to the realism required for the development of the scenario.

The teacher and the simulation teacher coordinator must define the complexity of a scenario by selecting the objectives of the cognitive domain of a course that performs activities in simulation and must place the verbs according to the six levels of Bloom's taxonomy to perform this exercise. They must use the format to define the complexity of a scenario.

It is important to note here that, in the Faculty of Education at the Universidad Hispanoamericana, the simulation is done by hiring professional actors who, in coordination with the course professors, carry out the simulation. The importance of the accompaniment of these professional actors in each of the simulations is that it allows the student/user to be immersed in a scenario close to reality but in a controlled and safe way.

Furthermore, a relevant aspect is that at the end of the simulation, the actors, from the perspective of the character they were playing, generate feedback that allows the student to know the successes and failures of the simulation and from there, generate an exhaustive analysis of the situation and of the correct approach to it.

QUALITATIVE ANALYSIS AND RESULTS

In order to know the effectiveness of this methodology, a qualitative research was carried out. It began with sending a survey to each of the teachers who implement this methodology in their course; however, it should be noted that one of them does not work in the institution anymore, another one is no longer part of the Faculty of Education, another one is the simulation coordinator and bias was avoided. The remaining 4 did not send the survey in the requested time.

Eleven surveys, which were the sample for this qualitative analysis, were collected.

Data collection is important to carry out a good investigation; it is a crucial stage in which the instruments must be appropriately selected, so that the information collected serves as a basis for the analysis process.

There are various information collection techniques. It is mentioned that data collection techniques are the different instruments, strategies, and audiovisual media that social researchers use to collect information: interviews, observations, diaries, video recordings, analysis of documents, etc. (Latorre, 2005, p.53). For this reason, the technique used must justify the proposed objective.

The instrument detailed below was used for the development of this analysis.

1. The interview

The interview was used because it is part of the battery of qualitative research techniques, this in turn, is part of a way of approaching reality (López and Deslauriers, 2011, p.3).

Thus, the interview is very useful in descriptive studies since it is adaptable and susceptible to be applied to all kinds of subjects and situations, managing to delve into the subject.

As mentioned above, the interview was used for this analysis.

Information Subjects: Eleven professors - facilitators of the simulation strategy at Universidad Hispanoamericana

A previously elaborated five-question guide was used. It helped to collect general information on the effectiveness of the strategy, its objective, positive, and improvement

aspects of the strategy, as well as advantages and disadvantages that students share with teachers about the simulation.

The qualitative analysis showed that the simulation strategy is effective because, through it, the students face situations that are as real as possible, and that are experienced in educational contexts. This gives them a practical learning.

All respondents agreed that simulation develops skills that are required in the students' professional practice. Through simulations, students can enjoy activities and experiences that are representative of reality, which they could not otherwise experience because of time, difficult access to educational centers, among others.

Students develop critical thinking in situations that really allow them to test what they know, what they can do, and how they think it should be done. Many simulations develop decision-making skills, a very important aspect of thinking and problem solving.

All respondents mention the setting of the space, the professionalism of the actors, the technology used (Learning Space) as positive aspects. These positive aspects are the product of a joint effort and work.

The most prominent complaint about aspects to improve is the sound and the transportation between campuses to carry out the simulation. It should be noted that the respondents seem to have answered focusing on recent events and not by evidencing everything that happened throughout the implementation of the strategy.

The advantages are that it is the space in which the theory worked in class can be put into practice and visualize the successes and failures in order to generate a broader criterion that provides assertive solutions for different situations.

It should be noted here that to carry out a simulation process in education and achieve effectiveness, it is necessary to follow these steps:

1. Fill out the necessary information in a scenario planning document which consists of the following sections:

a) Basic data: information relevant to the author, course, students, schedules, and reviews is included.

b) Time distribution: the amount of time for each phase of the scenario to be developed is detailed.

c) Case summary: it is a brief overview of what is going to be presented to the student, with relevant data from the student's anamnesis.

d) Objectives: the dimensions of competences that are expected to be evaluated at a cognitive, psychomotor, and attitudinal level through the learning objectives are detailed.

e) Interpretive Section: The aspects required for the personification of the actor are detailed. The student's record, parents or family data, social and behavioral aspects are included here.

f) Operational Process: the required activities of the technical staff for the proper functioning of the equipment, set up and shutdown, distribution of furniture, and supplies in the area assigned for the stage are detailed. The scheme of the stage is provided ensuring that the learning objectives are met before starting the set-up of the stage.

g) Instructions for the student: the student is indicated the role or function within the stage and in the observation room, expectations of the stage, aspects of personal protection, behavior, and discipline.

h) Instructions for the teacher: the main teacher or guest teachers are told their role in the development of the scenario, during the debriefing, behavior and treatment of the student, the elements of surprise, lifesavers, and expectations. The debriefing modality and aspects to be carried out during it are also indicated.

i) Bibliography: magazines, articles, guides, international protocols, texts, and audiovisual material used for the elaboration of the scenario are attached.

j) Case evaluation: this section includes the evaluation form, percentage in the grade, instrument, and instructions to complete it.

k) Annexes: they are all those related documents that provide support to the stage such as images, films, documents, articles from educational magazines.

2. The teaching coordinator of the Center for Simulation in Education (CSE) must review the scenarios and ensure that the most current national and international standards in education are met. The teaching coordinator must not ignore the process and procedures issued by the governing body of education in Costa Rica: Ministry of Public Education (MEP).

3. The Teacher must make the corrections and send the documents again for final approval.

4. The CSE teaching coordinator must review and approve the scenarios and the "Requests for Simulation Activities". If everything is correct, the coordinator must reserve the room, verify the requirements of the scenario, equipment, accessories, and necessary supplies.

5. The teacher should consider in the implementation and testing of the scenarios the following indications of the debriefing process with good judgment for the analysis of the scenario:

a) The teacher or facilitator must create a context for learning and change.

b) The main objective of the analysis should be to share the participant's point of view and opinion.

c) The teacher and classmates must respect the opinions.

d) Mistakes and successes should be discussed openly, encouraging self-criticism and corrections by the instructor and colleagues, always with discipline and respect.

e) The mental model must be investigated.

f) Inquiry-persuasion strategy: persuasion indicates what is observed; then what this action or inaction implies or concerns. The inquiry allows to know the point of view of the student and classmates to understand the mental model of the student.

Indications for the teacher-facilitator

a) The teacher should take notes during the case to guide the debriefing.

b) The teacher must direct the reflections towards the objectives although it is the students who must reach the conclusions.

c) The teacher should encourage analysis and discussion during the debriefing:

- Must direct the session, but the teacher is not the main actor.
- Must listen and observe without monopolizing the analysis.
- Must ask generating questions.
- Must prepare a final report and make recommendations for improvement drawn from experience.

For the debriefing process, it is the teacher's decision to use the iPads that are linked to the Learning Space, so that each of the students can make annotations of what was seen on stage. In the case of not using the iPads, the teacher must establish precise instructions to the students about their responsibilities and discipline within the observation room.

For the debriefing process, it is the teacher's decision to use the stage recordings to reinforce any aspect.

6. In order to participate in Simulation in Education activities and image/audio capture in the Simulation in Education Center, an informed consent must be completed that is addressed to students, teachers and officials, in order to respect the privacy of all people who make use of the facilities.

7. In addition, the steps to be followed by the CSE must be established to ensure the physical and psychological integrity of the students.

The responsibility of implementing, reviewing, and updating this procedure corresponds to the Dean and Teaching Coordinator of the CSE.

The responsibility of providing safety instructions to students in relation to situations that have the potential to cause harm to the student's physical integrity during any simulation, be it low, medium, or high, corresponds to the teacher.

The responsibility of complying with the safety instructions provided for the development of the simulation corresponds to the student.

Any participant in the simulation activities must notify the teacher of any incident or accident within the CSE facilities, and the teacher must notify the CSE coordinator.

The simulation teaching coordination must approve the scenarios and activities in simulation before the execution, evaluating the difficulty, stress level, preparation and response capacity of the people who carry it out, ensuring emotional safety. Every student emotionally affected in the development of a low, medium, or high simulation activity must be removed from the stage by the teacher and attended in order to evaluate the event and to provide emotional and psychological security.

All the above, which is the systematization of Simulation in the Faculty of Education, has been a key element for its effectiveness and fulfillment of the objectives.

DISCUSSION

Simulation in education, specifically in students who are being trained to be future educators, becomes relevant in current contexts where access to educational centers for observations and educational practices is increasingly difficult. It should also be noted that in pandemic situations such as those experienced in 2020, the simulation was able to solve this need and continue to train professionally from a perspective consistent with

current reality. In fact, the simulations in the 2020 pandemic were generated through virtuality.

It is important to establish that despite the fact that simulation allows the future teacher to get closer to reality, it will not always be able to represent or reproduce completely situations that are generated inside the educational centers; hence, the component of using professionals actors is perhaps the option that reduces the most this disadvantage that many authors have given to simulation. The professional actors are hired for the simulations considering that they have a dramaturgical training and a trained capacity in performance that facilitates the educational activity, which is focused on learning objectives and put at the service of students in professional training. Another important factor that contributes to the adequate preparation of actors is the growth of the level of realism of the simulation scenarios.

Another important aspect of discussion is that the professors who attend the education courses must be active, with work experience, so that the scenarios or profiles are as real as possible and in accordance with the current educational context. And even more important, the professor must be open to change and updated, but above all, the professor must be willing to innovate, generating significant changes in existing pedagogical practices.

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