

THEORETICAL PAPER/ESSAY

# Learning and development in simulated practice environments

Aprendizagem e desenvolvimento em contexto de prática simulada  
Aprendizaje y desarrollo en el contexto de la práctica simulada

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## Abstract

**Background:** This article gives support to the oral presentation with the same title presented at the 5th Congress on Nursing Research of Ibero-American and Portuguese-speaking Countries. It puts forward a set of arguments that support the use of simulated practice in nursing education.

**Objectives:** To analyze how simulated practice contributes to the learning and development process of nurses and nursing.

**Methodology:** Theoretical study derived from the author's knowledge and experience, using recent evidence to provide consistent results.

**Results:** The results underline the importance of simulation as a pedagogical strategy in the process of development of nursing skills, based on the dimensions of ethics and esthetics, knowledge, efficiency and effectiveness, emotions and relationships, leadership and, inevitably, patient safety.

**Conclusion:** Simulation is an effective pedagogical strategy, with positive outcomes for nursing education and development, what justifies greater investment in this area.

**Keywords:** nursing; learning; education; simulation

## Resumo

**Enquadramento:** O presente documento dá suporte à comunicação com o mesmo título, apresentada no V Congresso de Investigação em Enfermagem Iberoamericana e de Países de Língua Oficial Portuguesa. Apresenta um conjunto de argumentos que sustentam a utilização da prática simulada no ensino de enfermagem.

**Objetivos:** Analisar os contributos da prática simulada para a aprendizagem e o desenvolvimento do enfermeiro e da enfermagem.

**Metodologia:** Estudo teórico alinhado pelo conhecimento e experiência do autor, e que utiliza algumas evidências recentes, de forma a conferir maior consistência aos mesmos.

**Resultados:** É enfatizada a importância da simulação, enquanto estratégia pedagógica, para o processo de construção das competências para o exercício da enfermagem, trazendo como bases justificativas as dimensões da ética e da estética, do conhecimento, da eficiência e da efetividade, da emoção e da relação, da liderança e, inevitavelmente, da segurança do doente.

**Conclusão:** A simulação é uma estratégia pedagógica efetiva, com resultados positivos para o ensino e desenvolvimento da enfermagem, justificando-se maior investimento na área.

**Palavras-chave:** enfermagem; aprendizagem; educação; simulação

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## Resumen

**Marco contextual:** El presente documento sirve como soporte para la comunicación con el mismo título, presentada en el V Congreso de Investigación en Enfermería Iberoamericana y de los Países de Lengua Oficial Portuguesa. Presenta un conjunto de argumentos que apoyan la utilización de la práctica simulada en la enseñanza de enfermería.

**Objetivos:** Analizar las contribuciones de la práctica simulada al aprendizaje y al desarrollo del enfermero y de la enfermería.

**Metodología:** Estudio teórico alineado por el conocimiento y la experiencia del autor, junto a los cuales se intentaron movilizar algunas pruebas recientes con el objetivo de aportar mayor consistencia a los mismos.

**Resultados:** Se enfatiza la importancia de la simulación como estrategia pedagógica, para el proceso de construcción de las competencias para el ejercicio de la enfermería, teniendo como bases justificativas las dimensiones de la ética y de la estética, del conocimiento, de la eficiencia y de la efectividad, de la emoción y de la relación, del liderazgo e, inevitablemente, de la seguridad del paciente.

**Conclusión:** La simulación es una estrategia pedagógica efectiva con resultados positivos para la enseñanza y el desarrollo de la enfermería, lo que justifica una mayor inversión en el área.

**Palabras-clave:** enfermería; aprendizaje; educación; simulación

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## Introduction

The Nursing School of Coimbra (*Escola Superior de Enfermagem de Coimbra - ESEnFC*), heir of the oldest nursing education in Portugal, is a nationally and internationally recognized public institution seeking to be a leader in several areas, namely in the use of the latest technologies to support the teaching and learning process.

The recent designation of the ESEnFC as a World Health Organization Collaborating Center for Nursing Practice and Research gave international recognition to the ESEnFC's potential to produce and disseminate knowledge in this area since one of its aims is to conduct research on educational practices of excellence.

The ESEnFC hosts the Health Sciences Research Unit: Nursing (*Unidade de Investigação em Ciências da Saúde: Enfermagem - UICISA: E*) whose mission is to conduct scientific research in health sciences, specifically nursing. To this end, the Unit has research groups with projects in three different nursing areas: training, clinical practice, and management. The training group integrates the project *Simulation in nursing education*, which seeks to develop and validate innovative educational practices using simulation, as well as to test and assess outcomes associated with this pedagogical strategy.

This article aims to put forward scientific results and their contribution to the development of nursing with the purpose of demonstrating the intrinsic value of simulated practice as a pedagogical strategy.

This work was developed through the combination of knowledge and experience acquired over the past years and recent evidences that go far beyond the list of references included in this article.

It should be noted that, although there is no conflict of interest, the author believes in the value of the pedagogical strategy under analysis. He uses it in his daily teaching activities, having dedicated his time and efforts to it; simulation has also served as basis for his own personal development.

Before proceeding any further, some core concepts should be clarified. To this end, the following concepts will be used, as proposed

by Meakim et al. (2013):

Simulation - a pedagogical strategy using one or more typologies (simulated patient, *role-play*, task simulator, ...) to improve or validate the progression from novice to expert;

Simulated-based learning experience - an array of structured activities that represent an actual or potential situation, in which participants develop a set of activities in a simulated but realistic environment and using actual materials and equipment;

Fidelity (realism, authenticity) - degree to which a simulated clinical experience approaches reality. The level of fidelity is determined by the environment, the materials and equipment used, and factors associated with the participants. Fidelity involves the following dimensions: physical (environment, tools, ...), psychological (emotions, beliefs, ...), social (participants' motivation, ...), culture of the group, degree of openness and trust, and participants' modes of thinking;

Debriefing - an activity that follows simulation, led by a teacher, who encourages participants' reflection-on-action and reflection-for-action. This activity uses a well-defined goal-centered structure during which positive reinforcement concerning interventions, emotions, and appropriate behaviors is provided, and less adequate interventions, emotions, and behaviors are discussed, seeking to transfer learning to future situations.

This article aims to analyze how simulated practice contributes to the learning and development process of nurses and nursing.

### Simulation as a pedagogical strategy

Simulation and simulated practice are today recognized as key pedagogical strategies in health professionals' undergraduate, graduate, and lifelong training, with an impact on several dimensions that range from student satisfaction to patient safety.

Several authors have recognized that simulation is an important teaching, learning, and assessment strategy in different levels of nursing education, with particular emphasis on student gains (Baptista, Martins, Pereira, & Mazzo, 2014; Martins et al., 2012).

Structured debriefing, as a systematized method of discussion and reflection-on-action associated with simulation, leads to better outcomes (Coutinho, Martins, & Pereira, 2014).

Simulation-related outcomes depend on multiple factors, as shown in Figure 1 (adapted from Jeffries, 2007), including the

characteristics of the simulation design, the teacher, the student, and the pedagogical practices used.

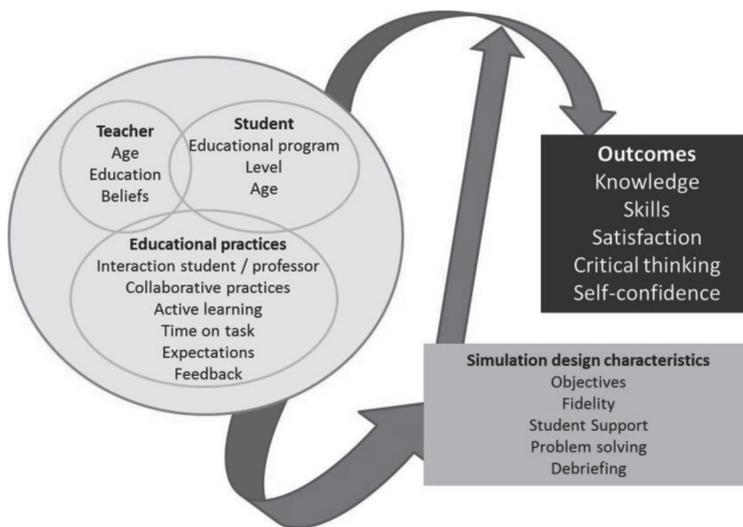


Figure 1. Simulation-related outcomes.

Developing nursing intervention skills is a complex process because professionals should not only know how to perform a set of technical actions, but also how to apply the best available knowledge, collect and process information, make correct decisions in various contexts, and adopt attitudes that ensure respect for the individual and build a helping relationship (Meakim et al.,

2013). The Figure 2 represents the Nursing skill development and clinical judgement model © from the Nursing Association for Clinical Simulation and Learning and is presented for Meakim et al. (2013) and shows some of these dimensions, which are essential for the nurse's professional development and to which simulation gives a significant contribution.

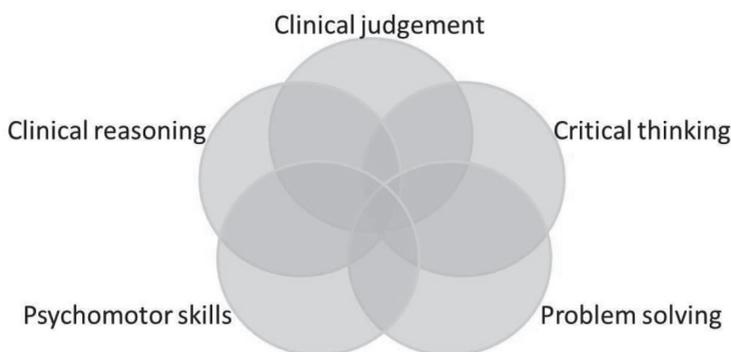


Figure 2. Nursing skill development and clinical judgement model ©.

In other words, as an active pedagogical strategy, simulation helps to consolidate knowledge and gives it value, develops technical and relational skills, helps to create rules and habits for thinking and reflection, and contributes to the development of competent

professionals within a safe environment for students, teachers, and patients. Today we are aware of the benefits of replacing passive learning methods by experiential learning, which includes simulation. In this case, simulation becomes even more relevant

as a strategy to provide real clinical (albeit simulated) experience, allowing to balance experiences (both in quantity and in quality) among different students and incorporate variability, always with an anticipatory perspective, that is, simulating an experience before intervening in an actual clinical situation.

### **Ethics and esthetics**

Students are expected to develop evidence-based interventions in a safe and timely manner throughout their clinical internships, without their tutor or supervisor having to interrupt their actions due to technical errors that may compromise patient safety. Students should be *self-confident* and *trustworthy*, i.e. they should be able to perform error-free interventions, making their tutors or supervisors and other team members believe in their abilities, not to leave them without supervision, but rather to let them go into action.

From an ethical perspective, invasive procedures should not be trained on a real person; instead, trainees should be able to train this in simulated, controlled, and safe environments, allowing them to make errors and learn with and from mistakes, without any harmful consequences to a real person. This aims at ensuring the non-instrumentalization of the patient and quality nursing care, even during care providers' learning process.

Simulation is an excellent pedagogical strategy that helps nursing students to develop themselves in the field of ethics and apply ethical principles in clinical practice (Buxton, Phillippi, & Collins, 2014). In addition, it helps students to develop themselves ethically, promoting and acknowledging the importance of training while encouraging and enabling a deep respect for human beings and their dignity.

High-fidelity simulation also contributes to building the nursing students and nurses' identity, the relationship with their peers, and the expectations of and for future practice (Baptista, Pereira, & Martins, 2016; Foronda, Liu, & Bauman, 2013).

### **Knowledge that supports the action**

Simulation contributes to expanding and consolidating students' knowledge and building bridges for action, assigning it value and

adding relevance (Foronda et al., 2013; Martins et al., 2012).

The contribution of simulation to the development and consolidation of knowledge has been demonstrated using different methodologies in various clinical areas, and there is now sufficient evidence on this topic. For example, the meta-analysis of 26 randomized controlled studies (Lee & Oh, 2015) clearly shows the benefits of simulation in the cognitive and psychomotor dimensions, among others.

One of the justifications to take into account is precisely the fact that, through simulation, students can apply what they have learned, giving real value to what was previously something abstract, and that, through debriefing, which is necessarily integrated into simulation, students have the opportunity to revisit the action, explain, justify, and assign value to the correct action, and identify the necessary changes for future improvement.

### **Efficiency and effectiveness in action**

The most common benefits from using active pedagogical strategies involving simulation are the development of knowledge and skills for clinical judgment and establishment of priorities, decision-making, performance of correct procedures, teamwork, and correction of errors without any adverse effects in a real person (Foronda et al., 2013; Martins et al., 2012).

Some authors even suggest that high-fidelity simulation significantly improves trainees' expertise and technical skills, when compared to traditional methods (Lee & Oh, 2015). Training programs using simulation significantly improve the response to critically-ill patients, the level of surveillance, the identification of severity criteria, and response readiness, reducing the number of failure to rescue rate events (Foronda et al., 2013).

Significant positive results have been found in specific areas such as childbirth and newborn care, in the most diverse clinical contexts, at the end of life, in emergencies, in situations of physiological deterioration, and in disaster situations and multiple victim accidents.

The training of specific skills is essential, but it is through the resolution of complete and complex scenarios in simulated environments

that nurses consolidate their knowledge and develop their critical judgment and decision-making skills, as well as technical, relational, and ethical skills, among others (Martins et al., 2012).

The use of high-fidelity simulators can help nursing students to develop problem-solving skills, to think and act as nurses, and to acquire more assertive and therapeutic communication skills.

### **Emotions and relationships that improve actions**

Simulation improves students' self-confidence, satisfaction, and motivation for learning, among others (Baptista et al., 2014; Foronda et al., 2013; Martins et al., 2012).

Several studies (Foronda et al., 2013; Lee & Oh, 2015) have demonstrated that the use of high-fidelity simulation improves self-confidence. It should be noted that self-confidence is an important variable, and that evidence shows that a low self-confidence is associated with greater delay in the implementation of expected actions, more errors, and higher levels of anxiety (Baptista et al., 2014; Foronda et al., 2013; Martins et al., 2012).

Student satisfaction is also referred to as a variable with clear positive results associated with this pedagogical strategy, as shown in different studies (Baptista et al., 2014; Foronda et al., 2013). A learning environment that promotes student satisfaction motivates students to study and achieve the expected outcomes (Baptista et al., 2014).

### **Development of leaders**

Recent studies on leadership addressed training through simulation, having concluded that it improved skills in this area, namely self-confidence to lead, leadership effectiveness, team communication, teamwork, adherence to the leader's decisions, mutual aid, organization, authenticity, self-control, moral judgment, or information processing and use (Shapira-Lishchinsky, 2014). It is, therefore, an effective pedagogical strategy to create and train leaders in healthcare, with the potential to achieve better health outcomes.

### **Patient safety**

The purpose of nursing education and train-

ing should be to develop qualified and highly competent professionals, capable of providing evidence-based responses to the various needs of patients and their families.

Healthcare safety is a current and relevant problem, and a concern to international and national health organizations, such as the World Health Organization and the Directorate-General for Health, respectively. Throughout the care delivery process, safety must be a constant goal; therefore, nursing education programs cannot neglect this topic. It is worrying to note that in 2014, despite existing measures, many patients still suffer and die in result of health professionals' errors (Durham, 2014). The World Health Organization (WHO, 2015) dedicates an entire area of its website to patient safety and defines it as a worldwide priority area in care delivery.

A study sponsored by the National School of Public Health (Uva & Sousa, 2011) found that 11.1% of inpatients suffered adverse events, with most of them having an impact on the patients' lives and their recovery from disease, such as healthcare-associated infections and medication errors. In addition, the authors also found errors related to the professionals' inadequate preparation or the lack of or poor communication.

Simulated practice is an important strategy for training health professionals towards a safer and timely clinical practice (Durham, 2014) based on international guidelines, minimizing errors, and increasing trainees' sense of responsibility regarding their clinical practice.

Studies have also addressed the transferability of the knowledge acquired in simulated environments into clinical practice (McGaghie, Draycott, Dunn, Lopez, & Stefanidis, 2011), and concluded on the effectiveness of simulation at this level. Furthermore, several studies point to gains specifically associated with increased patient safety (McGaghie et al., 2011; Martins et al., 2012; Baptista et al., 2014) by improving the quality of care delivery and leading to fewer errors.

High-fidelity simulation has proved to be effective in the development of safe practices in several areas. However, there is still some debate about the benefits and costs of high-fidelity simulators, and some studies have even

suggested that the differences in terms of patient safety are not significant when compared to other types of simulation (Blum & Parcels, 2012).

### **Nurses' education and training and the integration of simulation**

There are some recommendations for nurses' education and training both nationally (Ordem dos Enfermeiros, 2007) and internationally (WHO, 2009), with regard to skills; however, these are mainly focused on the outcomes, omitting the process, i.e. how these skills are acquired and developed. For instance, the fact that at least half of the workload of the nursing curriculum *must* be spent in clinical settings and that schools need to have clinical simulation laboratories and use them in nurses' training seems to emphasize the importance of practical moments (WHO, 2009). More recently, in recommendation 5 of the document *Transforming and scaling up health professionals' education and training* (WHO, 2013), the WHO recommends that health professionals' education and training institutions should use simulation in their students' education and training, adding that high-fidelity simulation should be used in settings with appropriate resources and that lower-fidelity simulation should be used in institutions with limited resources.

Despite this, there are multiple gaps in this area in many countries: i) the lack of recommendations for nursing schools in terms of simulation; (ii) the lack of recommendations for the use of simulated training throughout undergraduate programs; (iii) the lack of recommendations for faculty training in this area; and (iv) the lack of national studies in this area, leaving us unaware of what we have and how we use it, what we do, and how and when we do it. In addition, every country has local and regional asymmetries, and the integration of simulation into the curricula seems to rely on decisions associated with various aspects, such as the ability to obtain and/or provide funding, existing facilities, curricular management, or even faculty's desire.

The plan of each institution to integrate simulation into the curricula also differs: simulation can be integrated into several curricular units; simulated practice itself can be one or more

curricular units; or simulated practice can be integrated into theoretical curricular units (as practical component) or into clinical teaching. In some models, students have the opportunity to train different techniques in different scenarios, while in others, students are mainly observers. In some organizations, simulation is used almost entirely for the purpose of learning and training specific techniques, whereas in others, greater emphasis is placed on training in complete scenarios of increasing complexity, where techniques are gradually incorporated and the focus is on developing more comprehensive and cross-cutting skills, such as patient and team communication, teamwork, decision-making, management of adverse events, leadership, and many others.

Despite the existing evidence, it is still relevant to examine how technology, simulation, informatics, and virtual experiences affect the learning process and its transferability to clinical practice (National League for Nursing, 2016).

### **Conclusion**

In recent years, the quality of higher education has received great attention across Europe. However, the truth is that this attention has focused more on faculty qualification and the quality of outcomes, rather than on process-related variables.

In the future, greater attention is expected to be given to pedagogical strategies, to infrastructures, materials, and equipment, to the respect for moral and ethical principles, and to the social demands of a profession that has to be strongly imbued with principles of humanism. Development will inevitably follow this same direction, using modern pedagogical strategies that respect those principles and whose effectiveness is supported by increasingly stronger evidence.

This article shows that the positive outcomes associated with the use of simulation justify its use in teaching and learning processes to the extent that simulation improves these processes and, in turn, contributes to the development of nurses and nursing. It is worth emphasizing the justifications and the outcomes – the dimension Ethics and aesthetics, the dimension Knowledge that sup-

ports the action, the dimension Efficiency and effectiveness in action, the dimension Emotions and relationships, that improve actions and the dimension Development of leaders – and, through these dimensions, the contribution to patient safety. This is not an universal solution, but the ex-

isting evidence cannot be denied. This evidence clearly shows the benefits and positive outcomes for students, teachers and, especially, patients resulting from the use of simulated practice as a pedagogical strategy to promote more solid knowledge and lead to a greater development.

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