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Comparison of Learning Facilitated by Traditional and Virtual Case Studies for Teaching the Nursing Approach to Care

Rabia Qaisar[1,*], Hind Bouzoubaa[2], Halima Lajane[3], Abderrahmane Lamiri[4], Fatimazahra Benchadlia[5], Omar Abidi[6] and Abderrahim Khyati[7]

[1]*Laboratory of Information and Education Sciences and Technologies (LASTIE), Faculty of science Ben M'sik, Hassan II University of Casablanca. Casablanca, Morocco*

[2]*Faculty of Sciences Ben M'sik, Hassan II University of Casablanca, Casablanca, Morocco*

[3]*Ibn Rochd University Centerl, Casablanca, Morocco*

[4]*Laboratory of Information and Education sciences and Technologies (LASTIE), Faculty of science Ben M'sik, Hassan II University of Casablanca. Casablanca, Morocco*

[5]*Laboratory of Information and Education Sciences and Technologies (LASTIE), Faculty of science Ben M'sik, Hassan II University of Casablanca. Casablanca, Morocco*

[6]*Higher Institute of Nursing Professions and Health Techniques of Casablanca (ISPITSC), Ministry of Health and Social Protection, Casablanca, Morocco*

[7]*Interdisciplinary Team of Didactics of Sciences and Educational Sciences (EIDS§SE), Multidisciplinary Laboratory of Educational Sciences and Training Engineering (LMSEIF). Ecole Normale Supérieure, Hassan II University of Casablanca, Casablanca, Morocco*

Abstract:

Aim:

The objective of this study is to investigate the adoption of these two strategies for teaching the steps of the care process to Moroccan nursing students. We attempt to answer the following questions: What is the preference of nursing students between traditional case studies and virtual case studies? What are their suggestions for improving teaching practices? According to their point of view, which of the teaching strategies is more conducive to the appropriation of knowledge and the development of skills related to the care process?

Background:

Case-based learning has long been one of the active teaching strategies widely used by nursing educators. However, the constraints inherent to traditional case study learning have prompted educators to seek alternative teaching practices. Today, virtual case studies are recognised as one of the most recommended and innovative teaching approaches to address these constraints in the nursing context.

Objective:

the present study aims to explore students' perceptions of traditional case studies and virtual case studies as facilitated learning methods for teaching the nursing process.

Methods:

We conducted a questionnaire survey at the Higher Institute of Nursing Professions and Health Techniques Casablanca in 2021 among first-year polyvalent nursing students. The course 'Conceptualization and Care Planning' was taught based on these two different pedagogies.

Results:

Comparing the means *via* a t-test of the paired samples showed that there was a significant difference for all items (p-value<0.005) between learning facilitated by traditional case studies and virtual case studies.

Conclusion:

These results demonstrate that virtual case studies are an innovative and well-received educational tool for nursing students compared to traditional case studies.

Keywords: Traditional case studies, Active teaching strategy, Virtual case studies, Nursing students, Teaching, Adoption.

1. INTRODUCTION

Due to the rapid changes, tension and complex circumstances characterising the healthcare environment, today's healthcare facilities need qualified nurses with strong problem-solving and critical thinking skills [1]. In particular, facilities require staff who are confident in their ability to make effective decisions in the different clinical situations they face on a daily basis [2, 3].

To meet these requirements, most nursing education programmes have adopted learner-centered active teaching approaches in recent years rather than traditional teacher-centered approaches [4]. Such approaches have been adopted to help students acquire a body of knowledge and to develop the professional skills necessary for nursing practice [5, 6].

1.1. Literature Review

Case-based learning has long been one of the active teaching strategies widely used by nursing educators [7]. Many researchers have demonstrated its beneficial effect on learning outcomes. In this regard, Sangestani & Khatiban (2013) [3] report that case-study learning has the potential to improve students' satisfaction with learning and motivate them to actively engage in the proposed educational activities. More recent research claims that, compared to so-called traditional learning methods (*e.g.* lectures), integrating case study–facilitated learning into teaching practice is a more effective learning strategy for promoting problem-solving skills [8], critical thinking [7] and increasing feelings of self-confidence [6].

Despite these advantages, some limitations have been reported in the literature as factors that may negatively impact case studies' retention in training programmes. For example, Forsberg *et al.* (2019) report that case studies cannot reproduce all the complexity nor contain all the information of the real clinical situation. This deficit may induce a feeling of stress and dissatisfaction in learners when analysing a clinical case [9]. Furthermore, other researchers have argued that the case study method has limited effectiveness in fostering clinical reasoning skills and promoting in-depth learning [10, 11].

Given these constraints, virtual case studies are now recognised as one of the most recommended innovative teaching approaches in nursing [12]. Virtual case studies, also known as computer screen simulations or virtual patient simulators, provide students with an authentic learning environment where they can assume the role of a practitioner to perform nursing procedures such as data collection and physical examination [13].

Previous studies report that the integration of virtual case studies into teaching activities as a pedagogical tool promotes short- and long-term knowledge appropriation [14] as well as the development of reflective skills [15], clinical skills [16] and decision-making [17]. Moreover, virtual case studies facilitate the learning of clinical reasoning [18], which is recognised worldwide as one of the major challenges of nursing education [19].

In the literature, many researchers in the medical field have evaluated the impact of simulation-facilitated learning – including virtual case studies – as an alternative teaching strategy [20] or as a complement to traditional case studies [21]. However, there is a lack of studies, particularly in nursing, that explore students' perceptions of traditional and virtual case studies. Thus, the objective of this study is to compare two teaching methods of the nursing process for Moroccan nursing students. We attempt to answer the following questions: What is the preference of nursing students between traditional case studies and virtual case studies? What are their suggestions for improving teaching practices? According to their point of view, which of the teaching methods is more conducive to the appropriation of knowledge and the development of skills related to the care process?

2. MATERIALS AND METHODS

2.1. Ethical Considerations

Ethical approval to conduct this study was granted by the Ministry of Health following a written request *via* the research institution explaining the interest and objectives of this research. Informed consent was obtained from the students, who were informed that participation in the study was voluntary with a guarantee of anonymity and confidentiality of their personal information.

2.2. Study Design

We used a combined quantitative–qualitative research design to answer the research questions. The study participants consisted of all first-year polyvalent nursing students (n=68) who attended the traditional and virtual case study learning sessions during the 2020/2021 year.

2.3. Study Background

'Conceptualization and planning of care' is a major module element intended for first-year nursing students enrolled in the professional degree cycle at the Higher Institute of Nursing Professions and Health Techniques Casablanca (ISPITSC) in Morocco. The module element consists of 10 hours of theoretical lectures, 14 hours of tutorials and one hour for the evaluation of knowledge.

The module's learning objectives focus on the development of the care process, which involves five steps: collecting objective and subjective data according to a predefined care model, analysing and interpreting these data, planning appropriate actions, executing interventions and evaluating outcomes. Traditionally, the steps of the care process are taught primarily through the analysis of written case studies and reflective exercises. In this study, a new and more innovative approach was used: virtual case studies

2.4. Design and Validation of Traditional and Virtual Case Studies

Contributors to the case studies included a group of nurse practitioners (n=4) with more than 10 years of experience in multidisciplinary services and a group of teachers (n=5) with experience using case studies to facilitate learning. The case

* Address correspondence to this author at the Laboratory of Information and Education Sciences and Technologies (LASTIE) at Ben M'Sick Faculty of Sciences, Hassan II University of Casablanca, Casablanca, Morocco; Tel: 00212 5227-04671; E-mail: rabiaqaisar9@gmail.com

studies were based on two main themes: the care of a mastectomised woman and the care of a diabetic girl.

The main guidelines for writing the case studies were as follows: the stages of the nursing care process, the learning objectives targeted in the training description of the polyvalent nursing programme and the students' level of experience. The content was validated by the stakeholders involved in the 'conceptualization and care planning' module.

The two virtual clinical scenarios were designed based on validated case studies using a digital platform « MedicActiv » with an authoring tool. They were designed to have the required specific and general pedagogical features [22] and adapted to meet the intended learning objectives, strictly following the standards of good practice [23]. In the authoring tool template, two sections exist ones that should necessarily be filled by the teacher like the title of the simulator, the topic, the target audience, the date, the context or the working situation, the patient characteristics and the setting…; as well as optional sections like the adding of various quizzes and documents such as images, X-rays, videos, *etc*.

Each scenario included three situations in which students could perform a variety of tasks related to a) data collection, b) data analysis and interpretation, c) formulating nursing diagnoses and d) planning appropriate actions.

Before using the virtual case studies in the classroom, we undertook an external review process with a group of stakeholders experienced in a virtual simulation. We then conducted a pilot test with student nurses to test the case studies' usability and ensure that the content of the virtual clinical cases was understandable prior to their implementation.

2.5. Planning and Organisation of Sessions

Over a period of 12 weeks divided into three phases, the students were invited to participate in educational activities organised by the teachers. The first phase was devoted to learning the course prerequisites and the steps of the care process using Microsoft PowerPoint. The second phase was based on tutorials in small groups during which the students were asked to participate in written case studies with well-defined guiding questions. In the third phase, students were invited to learn from virtual clinical scenarios presented in class under the teachers' guidance and supervision. Debriefing sessions were held during all learning sessions that employed virtual case studies [12] and written case studies. At the end of the second and third phases, questionnaires were administered to the students to measure their views and opinions regarding the traditional and virtual case studies.

2.6. Measurement Instrument

Based on previous work and the learning objectives of the course [24, 25], we designed two questionnaires to compare the pedagogical effectiveness of the two learning methods studied. The first questionnaire was for the traditional case studies and the second was for the virtual case studies. Each of these two questionnaires consisted of 10 questions in addition to demographic characteristics (age and gender); nine were closed questions assessing students' opinions and one was an open-ended question aiming to identify advantages, disadvantages and suggestions for improving teaching practices.

Students were asked to answer the eighteen closed questions on a Likert scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree). Students responded in writing to the open-ended questions.

The content of the measurement instruments was validated by the paramedical teachers practising at the Higher Institute of Nursing Professions and Health Techniques of Casablanca (ISPITSC). In addition, we measured the internal consistency of the questionnaire; Cronbach's alpha was 0.80 for the items related to traditional case studies and 0.71 for the items related to virtual case studies.

We conducted a pre-test with the study's target population to ensure that the items were clear and that there was no confusion that could affect comprehension.

2.7. Statistical Analysis

The quantitative data of the present study were analysed using statistical software (SPSS). The results are presented in tabular form. The data analysis was based on the description of means and standard deviations. We used a paired-sample t-test to compare the means.

For the qualitative data, a thematic analysis was initiated to generate themes [26]. The results are presented in the form of testimonials related to these themes.

3. RESULTS

3.1. Demographic Characteristics of Participants

The mean age of the students was 19.37 ($\pm$1.553) years with a female predominance (66.1%). The response rate to the questionnaires was 86, 76%.

3.2. Questionnaire Results

Table **1** shows that the average score for learning facilitated by virtual case studies is 3.945 $\pm$ .4606, compared to an average score of 3.135 $\pm$ .6991 for learning facilitated by traditional case studies. Comparing the average score by paired-sample t-tests showed that there were significant differences for all items (p-value <0.005) between learning facilitated by traditional and virtual case studies.

On the other side, study data show that the use of the virtual case study teaching method improved nursing students' ability at reasoning and analysis, that is 3,95 $\pm$ 818 as well as reduced their feeling of anxiety with a mean of (3,75 $\pm$1,076).

3.3. Results of the Qualitative Data

Table **2** shows the students' answers to the open-ended questions in the questionnaire and their suggestions for improving teaching practices. The qualitative analysis suggests that the majority of the students' answers are in agreement with the items of the questionnaire (quantitative analysis); the exception is feedback, which was highlighted by the students' comments and reflects the positive effect of learning through virtual case studies

Table 1. Results of the student questionnaire on their opinions of learning facilitated by traditional and virtual case studies (n=59).

Items	Traditional Case Studies		Virtual Case Studies		t-test for Comparison of Average Score	
	Average Score	Standard Deviation	Average Score	Standard Deviation	Test t	P value
Item 1: I appreciate case study learning.	3,46	1,104	4,32	,507	5,766	,000
Item 2: Case study learning has helped me to improve my analytical and clinical reasoning skills.	2,85	,997	3,95	,818	6,052	,000
Item 3: Case study learning has helped me to develop my skills in collecting subjective and objective data.	3,05	,955	3,71	,892	4,094	,000
Item 4: Case study learning helped me to improve my ability to implement a nursing care plan.	3,05	1,121	3,98	,861	4,984	,000
Item 5: Case study learning helped me to better understand the steps of the nursing process.	3,19	1,167	3,92	,877	3,865	,000
Item 6: The case study learning environment is realistic.	3,12	1,261	3,97	,830	4,166	,000
Item 7: Case study learning helped me to increase my confidence when managing patients in a clinical setting.	3,14	1,137	3,81	,776	3,836	,000
Item 8: Case-based learning has helped me to feel less anxious about caring for patients in a clinical setting.	2,97	1,066	3,75	1,076	3,698	,000
Item 9: to engage in facilitated learning through traditional case studies or virtual case studies.	3,41	1,191	4,10	,736	3,703	,000
Average Total Score	**3,135**	**,6991**	**3,945**	**,4606**	**7,807**	**,000**

Table 2. Student responses to open-ended questions about learning facilitated by traditional and virtual case studies (n=59).

Theme/Category	Testimonials
Theme 1: Learning about the care process	I found learning through virtual case studies much better than traditional case studies, it helped me to better understand the steps of the care process and to relate to these steps.' - 'I think the teaching facilitated by the virtual case studies, is ideal for learning the steps of the care process in a different way.' - 'With the traditional case studies, I was a bit confused, I didn't know what to do, or how to conduct data collection…' - 'I find the virtual case studies more structured compared to the traditional case studies, where it often felt like there was not enough data.' - 'The virtual case studies encouraged me to identify relevant information in a more accurate way compared to traditional case studies.' - 'It is enjoyable as a learning method.'
Theme 2: Realism	- 'I liked the interviews built into the simulator...it felt so real'. - 'I liked the fact that I could hear the heart sounds.'
Theme 3: Clinical reasoning and decision-making	- 'The multiple choice questions offered by the virtual case studies helped me to think a lot more, to discuss the case with my friends and especially to reason differently.' - 'I never realized that making a clinical decision required so much thought and analysis.' - 'For me, at first, it was so strange but as time went on I could realize that I had a different view of things, especially during the posting of the second scenario, I wanted so much for my answers to be right.'
Theme 4: Establishing links between knowledge	- 'In order to respond to certain situations, I had to go back to the course and sometimes I also had to do research on the internet to understand.' - 'The implementation of the knowledge taught during the course activities in the form of scenarios encouraged me enormously; I had fun doing this simulation.'
Theme 5: Feedback	- 'I found the pre-formulated feedback from the clinical scenarios fascinating.' - 'I liked very much the comments that arise from our answers, I find them very enriching, because it gives us more explanations and details…I think it's better than the teacher's oral commentary.' - 'The feedback helped me to learn new concepts, enrich my nursing vocabulary and readjust my knowledge.'
Suggestions from students	-'Build more clinical scenarios.' - 'Use virtual case studies in other modules.' - 'Replace traditional case studies with virtual case studies.' - 'Use virtual case studies for summative assessments instead of paper-based case studies.'

4. DISCUSSION

Traditional case studies are one of the most common pedagogical approaches used by faculty in various professional fields [27, 28], including nursing [29]. However, some constraints inherent to traditional case study learning have led

nursing educators to seek alternative pedagogical practices [30].

In the present study, we found statistically significant differences (p-value<0.005) between learning facilitated by traditional and virtual case studies for all items. The majority of students agreed that, compared to traditional case studies, virtual case studies are an effective teaching strategy to understand the process of care, improve their ability to collect objective and subjective data and implement nursing care plans. These results are in line with the study by Barnett *et al.* (2016) [21], which found that students in the virtual case study group were able to perform rigorous subjective data collection better than the traditional case study group. According to the author, this result can be explained by the simulated interviews made available to the students in the virtual scenarios, which allowed them to further enrich their data collection, especially in the subjective domain. Similarly, Qaisar *et al.* (2020) [31] argue that virtual case studies are a suitable pedagogical tool for teaching the steps of the care process. Forsberg *et al.* (2019) point out that the active involvement of students in simulated virtual learning environments, which value interaction and the mobilisation of high-level cognitive abilities, can only enhance the understanding, appropriation and integration of new knowledge [9].

We also found significant differences in the development of clinical reasoning skills, the reduction of anxiety and the enhancement of self-confidence compared to traditional case studies. These results are consistent with previous research. For Forsberg *et al.* (2019) integrating active teaching strategies – including virtual case studies – into the initial training curriculum of nursing students can be an excellent way to teach and assess the clinical reasoning process. The same authors add that virtual clinical case studies have a dual purpose. On the one hand, they aim to provide students with a real-life experiential learning environment through which they can more fully and explicitly articulate their analytical strategies. On the other hand, they provide teachers with an innovative pedagogical tool for supporting and assessing students in their analytical and reasoning processes [9].

Gore *et al.* (2011) report that preparing student nurses for the clinical setting is a rather complex task. They add that students at the beginning of their studies are often anxious and worried about caring for patients [32]. In the present study, it appears that learning from virtual case studies rather than traditional case studies helped students to feel less anxious and more confident in their ability to manage patients later. These results are in line with data from Fidler's (2020) study, which measured students' confidence in their abilities and skills to take a medical history and assess patients' physical condition during the course; students' confidence improved significantly after participating in sessions facilitated by virtual case studies [33].

Lack of realism is also one of the constraints most frequently cited by researchers as a limitation of traditional case studies [30]. The results of this qualitative and quantitative study confirm this finding. The students found the virtual case studies more realistic than the traditional case studies. One student said, 'I liked the interviews in the simulator, it felt so real', and another said, 'I liked hearing the heart sounds'. This result can be explained by software's ability to reproduce images and to emit sounds such as heartbeats, which traditional case studies cannot convey [34].

Moreover, the qualitative data from this study revealed feedback to be an unexpected variable favoured by the students. Some students stated that 'the pre-formulated feedback from the clinical scenarios fascinating' Others reported that the virtual case studies helped them 'to learn new concepts…and to readjust their knowledge'.

Many researchers have highlighted the benefits of integrating formative feedback into simulated learning environments [35, 36]. For example, Koh (2008) reports that feedback provided immediately following a task plays a crucial role in improving knowledge and performance and in increasing motivation and student satisfaction with learning [36].

CONCLUSION

Our results suggest that learning facilitated by virtual case studies is an innovative and well-received educational tool for student nurses compared to traditional case studies. In particular, the qualitative and quantitative results demonstrate that virtual case studies significantly improved students' skills in clinical reasoning, data collection and the development of nursing care plans. In addition, this approach helped students to feel more confident in their abilities and reduced their anxiety. Therefore, we hope that this work encourages teachers to further develop and integrate virtual clinical scenarios into their practices as an alternative or complementary teaching strategy to traditional case studies, both to teach the nursing process and to innovate their pedagogical methods. This approach will allow instructors to respond more effectively to the growing learning needs of nursing students and the requirements of the profession in terms of quality and professionalisation.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval to conduct this study was granted by the Ministry of Health following a written request *via* the research institution explaining the interest and objectives of this research.

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT TO PUBLICATION

Informed consent was obtained from all participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

Data supporting the conclusions of the article are available from the corresponding author [R.Q] upon request.

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CONFLICT OF INTEREST

The authors do not declare any conflict of interest, financial or otherwise

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