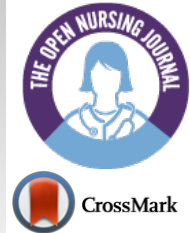




The Open Nursing Journal

Content list available at: <https://opennursingjournal.com>



RESEARCH ARTICLE

Effect of Online Training in the Continuing Education of Nurses in Hospitals in the Casablanca-Settat Region

Amina Lhbibani^{1,2,*}, Jabran Daaif⁴, Said Lotfi³, Malika Tridane^{1,4} and Said Belaouad⁴

¹Laboratory of Physical Chemistry of Materials, Ben M'sik Faculty of Sciences, Hassan II Casablanca University (UH2C), Post Box 5366 Maarif, Casablanca, Morocco

²Higher Institute of Nursing and Health Technology Professions Casablanca- Settat, Street Faidouzi Mohamed, Casablanca 20250, Morocco

³Multidisciplinary Laboratory In Education Sciences and Training Ingeneering. Normal Superior School (ENS), Hassan II University of Casablanca (UH2C), BP 50069, Ghandi

⁴Regional Center for Education and Training Trades Casablanca- Settat. Street Stendhal Derb Ghallef, Casablanca, Morocco

Abstract:

Context:

Nowadays, e-Learning has become essential for the continuing education of health professionals, especially in developing countries. Its introduction in health care settings guarantees better opportunities for disseminating knowledge and skills.

Objective:

This study aimed to measure the effects of online training "E-learning" on the learning outcomes of nurses in two hospitals in the Casablanca-Settat region with the course "Health planning" as a training theme.

Methods:

This study is an experimental type, including an experimental group that benefited from online training (B, $n^2 = 30$) and a Control group that benefited from face-to-face training (A, $n^1 = 30$). We used a questionnaire to evaluate the nurses' knowledge (general and procedural) in pre and post-training and a questionnaire to evaluate the nurses' satisfaction with using e-learning in continuing education.

Results:

The results show a positive effect of online training on nurses' learning through an increase in knowledge (general and procedural) after comparing the average score in pre and post-training (The p-value is less than 0.05). Also, high satisfaction with the content covered, the methodology used in the e-Learning, and the quality of the platform.

Conclusion:

These results should encourage and motivate those responsible for continuing education to adopt online training as a complementary and promising solution to ensure flexible and continuous continuing education sessions for healthcare personnel.

Keywords: Nurse, Effect, Online training, E-learning, Face-to-face training, Healthcare personnel.

Article History

Received: October 22, 2021

Revised: November 16, 2021

Accepted: February 22, 2022

1. INTRODUCTION

Nursing has come a long way in recent years. These changes are intimately linked to the evolution of nursing practice, the development of the profession, and to the emergence of information and communication technology (ICT), which necessarily requires nursing personnel to acquire new knowledge and develop other skills, as well as to renew these clinical practices based on evidence [1].

With this in mind, the continuing professional education for nurses has taken on an important role in human resources strategies to protect the population and improve the quality of care. It is an inseparable part of innovation in the provision of quality care; also, it is the guarantor of the renewal of nursing practices [1 - 3].

In this regard, continuing professional development (CPD) in healthcare establishments is becoming a regulatory and ethical obligation requiring its healthcare staff to participate in continuing education activities annually to maintain their right to practice [1 - 3]. Therefore, nurses are faced with a legal

* Address correspondence to this author at the Laboratory of Physical Chemistry of Materials, Ben M'sik Faculty of Sciences, Hassan II Casablanca University (UH2C), Post Box 5366 Maarif, Casablanca, Morocco; Tel: 0659699333; E-mail: aminalhbibani@gmail.com

responsibility to keep their specific knowledge and skills up to date in the care provided [1 - 4].

In Morocco, continuing education is recognized as a right of all health care professionals and the administration's duty. The Continuing education programs for the latter are managed and financed by the Ministry of Health or the autonomous hospital centers [5, 6].

However, despite the initiatives undertaken by the Moroccan Ministry of Health to train nursing staff working in hospitals, the continuing training of the latter comes up against numerous constraints arising, on the one hand, from organizational difficulties, of a personal nature in terms of availability, and financial difficulties [7] resulting in low participation of nursing staff in continuing education actions in different countries [1 - 5].

In addition, the arrival of information and communication technologies (ICT) in training has given rise to new distance training devices (*e.g.*, programmed teaching, video conferencing, courseware, and multimedia tutorials on CD-ROM, e-learning, *etc.*). These new devices, including e-learning or online learning, seem interesting to counter the barriers to the CE of nursing staff listed above [8, 9].

In addition, the arrival of information and communication technologies (ICT) in training has led to the emergence of new distance learning devices (*e.g.*, programmed teaching, video conferencing, courseware, and multimedia tutorials on CD-ROM, e-learning, *etc.*). These new devices, including e-learning or online learning, seem interesting to counter the barriers to CE of nurses listed above [8, 9].

To solve the problems of the continuous training of nursing staff and to accomplish their permanent updating, to face the constant evolutions of technology, knowledge, and skills required by a better and more efficient health system, we conducted this study that aims to improve the practices of continuing professional training for nursing staff in hospitals in the Casablanca-Settat region. Indeed, our experimental study aims to adopt online training "e-learning" in the continuing education of nursing staff as a complementary and promising solution to ensure continuous training sessions that are both flexible and continuous for nursing staff.

Our main question is:

What would be the effect of online training "e-learning" on the development of knowledge (general and procedural) of nursing staff?

Two objectives are set to answer this question:

- Measure the effects of online training on the knowledge (general and procedural) of nursing staff.
- Measure the degree of satisfaction of the nursing staff with the online training.

This experimental study contains an experimental group and a control group; it aims to test the following research hypothesis: "The experimental group composed of the nurses continuing online education will obtain a score in post-training higher than the nurses in the Control group."

The article is structured as follows: an introduction that contextualizes the research problem and sets out the objectives of the work. This is followed by a review of the literature dealing with the various theoretical and empirical studies on the subject in question. The following section describes the methodology used, and finally, the document ends with the presentation of the results, a discussion, and a conclusion.

2. LITERATURE REVIEW

This review of the literature covers, on the one hand, the different studies that have the merit of treating the interest of continuing professional development in the nursing profession and, on the other hand, the effects of online training in nursing practice.

2.1. Continuing Education for Nurses: between Requirement and Necessity

Scientific development places the nursing profession in a dynamic and evolving perspective, hence the need for continuing education for nurses capable of adapting simultaneously to technical and scientific progress and society's new health needs. Therefore, in nursing science, continuing education is defined as

"A permanent, active and sustained process in which the nurse engages throughout his or her professional life to acquire, through learning activities, new knowledge that will allow him or her to develop his or her skills and provide the population with quality care and services" [1].

The need for continuing education for nurses has been identified for various reasons, including that basic nursing education is still considered inadequate. However, even if this training could meet all the criteria of excellence, yesterday's and today's knowledge would not be sufficient to deal with the technological and organizational advances in our care institutions [10].

Also, there are several important incentives to adhere to the process of continuing education, which stem from our ethical obligations towards patients, who are entitled to safe, humane, and quality care [1], and from our professionalism in the search for new knowledge, which must characterize the actions of our nursing profession [1 - 10]. Personal satisfaction may seem of little importance, but it often plays a convincing role in the decision to engage in continuing education [10].

Indeed, against its interest which is emphasized by several organizations and authors as a right of all health professionals regardless of their mode of practice and duty of the health institution to which they are attached [1, 11, 12]. CE becomes a requirement for the continuous professional development of nurses throughout their careers. Therefore, nurses have a legal responsibility to keep their knowledge and skills up to date in the care they provide [1, 12].

2.2. E-learning for Training: A Luxury or a Necessity for the Nursing Professional

Continuing education in health care institutions is carried out in the face-to-face mode, which is still the most widely used model because of its traditional nature. However, studies

have demonstrated that this approach to education has a range of limitations: it does not recognize the personal differences and needs of learners and, in some cases, does not address problem-solving, creative thinking, and other high-level cognitive skills [8, 13, 14].

As a result, many researchers have also emphasized the need to modify or supplement face-to-face continuing education methods with modern teaching strategies [8, 15] and to combine multiple teaching methods to increase responsiveness and transfer of learning among nurses [5].

Subsequently, implementing e-learning platforms in continuing education can be a source of information that initiates pure constructive learning and substantially complements traditional teaching methods [5 - 14].

Several researchers have stated that online training allows different learning styles to be accommodated, distance learning becomes possible, more time is saved, and information and skills can be shared [16].

While other researchers have shown that online training has potential benefits in terms of personalized learning, allowing health professionals to adapt the pace and content of teaching to their individual needs, improving the accessibility of information at a distance, reducing costs, and facilitating the updating of content [16 - 18].

Indeed, authors have concluded that to remedy the “space-time” constraints linked to traditional teaching or the specific circumstances of the learners or lifelong learning, e-learning increasingly allows easy access to training [8, 13, 17, 19].

2.3. A Pedagogical Engineering Approach is Relevant

The use of online training or “e-learning” is constantly increasing for the training of health professionals worldwide [19]. Several authors have tried to measure the effects of e-learning in medical practice, and it has often been associated with large positive effects compared to no intervention and small positive effects compared to traditional learning [16].

Let us remember that e-learning refers to a distance learning process based on multimedia resources, favoring both accessibility and flexibility since the learner can learn at their own pace and the teacher/tutor can intervene in the same way to supervise the learners [17].

In general, the European Commission (2003) defines it as follows:

“Use of new multimedia and Internet technologies to improve the quality of education and training through remote access to resources and services, as well as collaboration and exchange” [21].

This definition clearly illustrates the two components of e-learning: the technological component and the pedagogical component, whose application and realization are only possible if the designers plan a meticulous pedagogical engineering approach upstream when designing an e-learning course [22].

2.3.1. The Technological component

The technological component in e-learning aims at

learning at a distance using computer tools. It is important to point out that in e-learning, interactivity is the order of the day: the learner is not a simple consumer; he is an actor in the process. On the one hand, they interact with the resources and tools. On the other hand, he interacts with the teacher, even if the latter is sometimes very “virtual” (e-tutoring), and with the other learners (virtual class, web 2.0) [22, 23].

2.3.2. The Pedagogical Component

Adding to this, the pedagogical component is as important as the technical component for an online training “e-learning” to be successful; and accessible for the learner, pedagogical engineering reconciling, the articulation of human, technical, and financial resources, according to the objectives of the training, the public and the constraints and resources of the project is of paramount importance. The function of pedagogical engineering is to treat the “input” data (analysis of the audience, training objectives, resources, and constraints) to produce the most efficient training system for the given objectives[17, 22, 23].

3. METHODOLOGY

3.1. Participants

This study is of type experimental randomized; the sample is formed by sixty (60) participants out of (191) in total, being part of the nursing staff at the level of two Hospitals in the Casablanca-Settat region (that is to say 31.41% of the sample) are drawn randomly in one of the two following groups:

The 1st group from the 1st hospital center of Berrchid was concerned by the face-to-face training. This is the control group (A, n¹ = 30).

While the 2nd group of the 2nd hospital center of Moulay Rachid) concerned by the online training. This is the experimental group (B, n² = 30) (Table 1).

Table 1. Experimental design.

Group	Independent variable	Dependent variable	Test
Control (A, n ¹ = 30). Experimental (B, n ² = 30).	Online training	The average post-training mark	The average post-training mark after having completed the continuing education course

Indeed, after a consultation and a consensus between the different persons responsible for the said institutions, an agreement was reached on the implementation modalities of these two types of education and the profiles of the nurses who will undergo continuing education (online and face-to-face).

3.2. Data Collection Methods

This experimental study contains an experimental group and a control group; it aims to test the following research hypothesis: “The experimental group composed of the nurses participating in the continuing online education will obtain a score in post-training higher than the nurses in the Control group.”

To meet the objectives of our study, we adopted a quantitative approach to measure the effects of continuing online education on the development of nurses' knowledge

(general and procedural) through the post-training score. We also measured nurses' satisfaction with using e-learning in continuing education. Thus, two questionnaires were used: a questionnaire to evaluate knowledge (general and procedural in pre and post-training) and a questionnaire to evaluate satisfaction with online training. The principal author of this study distributes both questionnaires.

3.3. Experimentation of the Training Sessions

3.3.1. Rationale for Course Selection

After an analysis of the identification of the need for training in this population, the theme was chosen to concern the course "health planning," which is a compulsory course with the main objective of "Strengthen the skills of health professionals in the health care facility in methods and tools of health planning." It should be noted that the pedagogical content was the same for both groups and was reviewed before use by a group of experts who were not involved in the study [24].

3.3.2. For the Online Training Session

The pedagogical design of the online course is illustrated by the ADDIE method (an acronym for Analysis, Design, Development, Implementation, Evaluation). The said online training was accessible 24 hours a day via the "Chamilo platform" regardless of the location of connection; the participant can connect to the only module entitled "Health planning," divided into five chapters put online respectively between October 25, 2019, and December 29, 2019.

The first meeting was a sensitization session for participants on the interest and use of online training "E-learning" in continuing education; each participant had the opportunity to create an account by giving him access to a login and password via the link of the platform address (address [HTTP:e-learnforma.com](http://e-learnforma.com)). The participants were invited to consult the pedagogical content online after each meeting, and also they could answer the interactive quiz proposed within the platform.

3.3.3. For the Face-to-Face Continuing Education Session.

The participants benefited from nine face-to-face training sessions of 3 hours per meeting. A questionnaire similar to the online training group was distributed before and after the training.

3.4. Evaluation Method

To meet the objectives of this study, we evaluated the first two levels of Kirkpatrick & Kirkpatrick's (2006) model; only the first and second levels (Reactions and Learnings) interested us indirectly [25]. Our interest is to point out any point that would allow us to improve the e-learning device in continuing education, whether it is the content, the platform, the methodology, or the quizzes.

Let us specify that general knowledge refers to theoretical knowledge and procedural knowledge refers to practical knowledge [26].

And the evaluation of the nurses' satisfaction regarding the use of e-learning in continuing education. Two evaluation systems were used: a questionnaire to evaluate the knowledge (general and procedural in pre and post-training) and a questionnaire to evaluate the satisfaction with the online training. For the development of the first questionnaire, for the evaluation of knowledge (general and procedural pre-and post-training):

Its first part contained 15 questions targeting the three levels of knowledge acquisition (knowledge, understanding, and application) according to Bloom's (1979) taxonomy [27]. Every 5 questions target a level of knowledge acquisition. The correct answers obtained a score of 1, and the incorrect answers or no answers obtained a score of 0.

The second part is designed for the evaluation of procedural knowledge and is based on a case study involving the development of an action plan to solve a problem of health using the problem-solving approach. This case study's interest is measuring the implementation of knowledge and the development of skills by the nursing staff at the level of their health care institution. For the evaluation of procedural knowledge, a 15-point grid was developed.

The content and face validity of the knowledge questionnaire were established by a panel of experts in the field of nursing education. Each participant was given 30 to 45 minutes to complete the questionnaire.

Besides, the second questionnaire for evaluating satisfaction with the online training consisted of five subscales, containing 22 items related to Quality of the e-learning platform, Quality of the online trainer, Methodology, Content, and Follow-up/evaluation. We used a Likert scale with five degrees by which nurses were asked to express their satisfaction or dissatisfaction with online training and to add any comments they wished.

3.5. Data Analysis Method

The data treatment is based on the description of the means and standard deviations of the scores of the knowledge evaluation questionnaire in pre and post-training of the online and face-to-face training groups. We used a 2-factor ANOVA; the post hoc analyses were analyzed by Fisher's test to determine the effect of continuing education, type of training, and their interaction on the means of the scores of general and procedural knowledge in pre and post-training of the two groups: experimental and control (p is set at 0.05).

The data are treated by SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.).

3.6. Ethical Considerations

The study was conducted after approval from the two hospital directors in the Casablanca-Settat region. Consent was also obtained from the participants. Participants were assured that their responses would remain confidential and their identities would not be revealed in research reports and publications.

4. RESULTS

4.1. Results of the Experimental Study

4.1.1. Demographic and Occupational Characteristics of Participants

The statistical analysis shows that there is no statistically significant difference between the experimental group and the control group in the demographic and occupational characteristics of the participants, with a p greater than 0.05 (Table 2).

Table 2. Internal consistency of the theoretical constructs of the satisfaction questionnaire according to Cronbach's α coefficient.

Variables (constructs)	Number of items	Average	Variance	\pm Standard deviation	Cronbach's Alpha is based on standardized items	Cronbach's Alpha
Total	22	96,13	20,257	4,501	0,901	0,877

4.1.2. The Effect of Online Training on General and Procedural Knowledge

Concerning the effect of continuing education on the two groups (experimental and control), it is observed that continuing education has a positive effect on the increase of knowledge scores (general and procedural) for both experimental and control groups ($p = 0.000$) with partial Eta-square of 0.976, it means that both the online and face-to-face methods of teaching were equally effective in promoting nurses' knowledge on the topic of "Health Planning" (Table 3).

Also, comparing the intergroup effect between the experimental and control group, it is observed that there is an

increase in general knowledge in post-training for the experimental group compared to the face-to-face group (14.10 ± 0.803) with a variation of 32.48% compared to (11.77 ± 1.382) of the control group with a variation of 3.708%. ($p = 0,000$).

Also, it is observed that there is an increase in procedural knowledge (10.43 ± 2.569) of the experimental group with a variation of 86% compared to the face-to-face group (9.07 ± 2.463) with a variation of 52%. This means that the group that benefited from online continuing education had higher post-training knowledge scores (general and procedural) than the face-to-face training group.

The increase in general and procedural knowledge scores in the experimental group is reinforced by the interaction between the two groups (experimental, control) ($p = 0.000$).

4.2. Results of the Satisfaction Questionnaire

4.2.1. Internal Consistency of the Theoretical Constructs of the Satisfaction Questionnaire According to Cronbach's α Coefficient

The test of Cronbach's Alpha that we exploited allowed us to measure the reliability of the scales of the questionnaire of the satisfaction of the nursing staff towards the tool used in the online training if they are supposed to measure the same construct. In principle, the values obtained vary from 0 to 1. The closer the value is to 1, the higher the internal consistency between the items of the same scale. Thus, in our results, the calculated value of Cronbach's Alpha is 0.877. All the items of the five scales are sufficiently inter-correlated: the internal validity of the questionnaire is, therefore, satisfactory [28, 29]. Indeed, we have kept all the items in the questionnaire for our study (Table 4).

Table 3. Demographic and occupational characteristics of participants.

	Groups (Experimental vs. Control)						Value Chi-square	ddl	Sig.
	Control		Experimental						
	Effective	Frequency	Effective	Frequency					
Gender	Female	22	73%	22	73%	,000 ^a	1	1,000	
	Male	8	27%	8	27%				
Age	[20 à 30 ans]	4	13%	4	13%	2,889 ^a	3	0,409	
	[31 à 40ans]	11	37%	7	23%				
	[41à50ans]	13	43%	13	43%				
	[51 à 59 ans]	2	7%	6	20%				
Profile	Anesthetist	5	17%	2	7%	3,309 ^a	3	0,346	
	Multipurpose nurse	21	70%	22	73%				
	Radiology Nurse	0	0%	2	7%				
	Midwife	4	13%	4	13%				
Professional seniority	1 à 5 ans	4	13%	4	13%	,000 ^a	2	1,000	
	5 à 10 ans	13	43%	13	43%				
	Plus de 10 ans	13	43%	13	43%				
Seniority in the service	6 months to 1 year	2	7%	2	7%	3,526 ^a	3	0,317	
	1 to 5 years	3	10%	2	7%				
	5 to 10 years	14	47%	8	27%				
	More than 10 years	11	37%	18	60%				

NB. a. 4 cells (50.0%) have a theoretical number of less than 5. The minimum theoretical size is 2.00. *Chi-square is significant at the 0.05 level.

Table 4. The effect of training, type of training, and their interactions on improving general and procedural knowledge.

Type of Knowledge	Groups (Experimental vs. Control)						Effect								
	Control		Experimental		Total		Training			Comparison inter group			Interaction		
	Av	SD	Av	SD	Av	SD	F	P	PES	F	P	PES	F	P	PES
General knowledge of “pre-training.”	2,50	1,456	2,90	1,242	2,70	1,357	2356,225	,000	,976	31,573	,000	,352	21,025	,000	,266
General knowledge in “post-training.”	11,77	1,382	14,10	,803	12,93	1,625									
Procedural knowledge in “pre-training”	5,93	2,993	5,60	3,587	5,77	3,280	63,641	,000	,523	739,535	,000	,927	2,898	,094	,048
Procedural knowledge in “post-training.”	9,07	2,463	10,43	2,569	9,75	2,588									

*PES: Partial Eta-squared ; *AV: Average.

Table 5. Results of the online training satisfaction questionnaire.

The subscales	Items	Average	Standard deviation
Quality of “The e-learning platform”	Its easy and immediate use	4,17	0,379
	Its design is pleasant and contains various functionalities	4,17	0,379
	Allowed me to take advantage of the Internet to create an opening to the world	4,17	0,379
	Allowed me to maximize the interaction between the trainer and the participants in order to support their learning	4,33	0,547
	Provided me with the necessary resources for in-depth learning	4,50	0,509
	Connect whenever and however I want.	4,93	0,254
	Stimulated my learning through a variety of activities	4,30	0,466
Quality of trainer	Favored my autonomy in learning	4,33	0,479
	Was able to answer my questions.	4,93	0,254
Methodology	Addressed the content competently and effectively	4,93	0,254
	Was varied in learning strategies (lecture, ppt presentation, case study)	4,43	0,504
	Favored the transfer of learning. Was relevant.	4,27	0,450
Content	Was relevant	4,73	0,450
	Was structured and updated.	4,93	0,254
	Always available within the platform	4,93	0,254
	Adequate for the learning objectives	4,93	0,254
Follow-up and evaluation	Interesting	4,60	0,621
	A placement test received before the online training was relevant	4,97	0,183
	Training on the platform was provided before the online training	4,93	0,254
	Follow-up and evaluation were provided during the online training	4,93	0,254
	Follow-up and evaluation were provided after the online training	4,97	0,183
	I would recommend this training to my colleagues	4,43	0,504

4.2.2. Results of the Satisfaction Questionnaire (B, n² = 30)

Regarding the averages of all the items constituting the different subscales (Table 5) the value ranged from (4.17±0.379 to 4.97± 0.183) which correspond to “Completely satisfied” and “Satisfied,” which suggests that the nurses of the experimental group (B, n² = 30) presented a positive perception of the online training in continuing education, about

The Quality of the “e-learning platform” allowed the participants to connect whenever and wherever they wanted and allowed them to stimulate their learning through a variety of activities and promote autonomy in learning.

The Quality of an online trainer determined how well they answered questions and addressed the content competently and

effectively.

The methodology used, which was varied by learning strategies (lecture, ppt presentation, case study), and the pedagogical design, favored the transfer of knowledge.

The content covered was always available on the platform and perfectly aligned with the learning objectives.

Follow-up and evaluation were offered before, during, and after the online training.

Participants' suggestions and comments:

A large majority of respondents expressed their opinions, wishes, and perceptions through suggestions and comments at the end of the questionnaire. The main suggestions were related

to

- The perception of the usefulness of e-learning for their continuing education: a proportion (60%) finds that e-learning will be beneficial for their work; it will undoubtedly improve their performance and fill the existing gap in continuing education.
- The need to master ICT (58%) declares the need to generalize computer training and information about E-learning in different hospitals.
- The availability of computer resources (56%) emphasized the need to equip hospitals with computer infrastructure or find ways to facilitate staff to acquire computers.
- The need for incentives for continuing education is a mandatory condition for advancement to higher grades and scales in the context of professional aptitude competitions.

5. DISCUSSION

This work is part of a reflection to improve continuing education practices for nurses in hospitals in the Casablanca region. This reflection aims to measure the effect of online training on the development of knowledge (general and procedural) of nurses.

The results obtained from the experimental study showed that continuing education has a positive effect on the increase of knowledge (general and procedural) of both groups, which reveals that both types of online and face-to-face training of nurses were equally effective in increasing knowledge and developing skills of nurses during these two training sessions. Our results are consistent with most of the other empirical studies conducted by Khatony *et al.* 2009 and Laine *et al.* 2019 to compare the effectiveness of online and face-to-face continuing education methods in increasing the knowledge of nurses in different health care settings [28, 29].

Indeed, many authors have stipulated that online training is more effective than face-to-face training. Therefore, the method based on online training is recommended, as a complement to face-to-face training, to design and deliver some topics of continuing education programs for nurses [28 - 30]. Indeed, it could be a useful tool to improve the self-efficacy of health professionals, even in demanding work environments.

In the same perspective, another finding was revealed by comparing the intergroup effect; it is noted that there is an elevation of the average post-training knowledge score (general and procedural) of the online training group compared to the face-to-face training group.

This result corroborates those of different studies identified (Gentizon *et al.* 2019; and Horiuchi and al. 2009) who stated that most of the nurses scored “good” in the post-test of online training [9 - 30] and also stated that the dropout rate was lower 0%, the flexibility of online training was reported by several participants [9 - 30].

On the other hand, Fenouillet and Déro (2006) [8] mention that e-learning appears to be generally equivalent to face-to-

face training, and the results of aptitude tests on a specific skill often even show a slight advantage for e-learning [8].

At the same time, the satisfaction questionnaire results suggest that, overall, nurses appreciate the e-learning pedagogical approach to training and would take an e-learning course again if offered. Indeed, the quality of the platform, content, methodology and learning strategies used were relevant to the participants and applicable in their work context.

Also, several participants noted the flexibility of the online training. They mentioned, among other things, that learning strategies varied the methodology of the online training “e-learning” (audio course, interactive quiz, recommended readings, case study ...). It is practical, accessible from anywhere (home or work), and allows nurses to connect whenever and wherever they want. It allowed them to access the course, to consult the content at any time, regardless of the time of day, and according to them, this educational approach promotes continuing education for nurses while taking into consideration family obligations, rotating work schedules, or night shifts.

These main advantages listed by the participants of the present study are similar to the advantages listed by several authors who revealed that e-learning courses would provide similar or higher knowledge gains compared to traditional classroom learning and that the level of performance on skill tests on a specific competency or competencies would be equivalent to face-to-face [8, 13, 22, 30]. However, for some authors, the design of the e-learning courses proves to be a determinant of its effectiveness [8 - 22].

The pedagogical strategies chosen must be motivating and facilitate the learning context. Moreover, they must consider, among other things, the different learning theories used and adapt to the different learning styles of the learner [8 - 22].

At the same time, the participants of the online training group stated that they would like to participate in another CE session using the same method. Another reason may be that online learning is a new experience for many nurses. And also, this could be justified by the fun features of e-learning, such as being self-paced and letting participants review the course whenever they want. Indeed, the trainers found this experience useful because it is, on the one hand, the first initiation to the management of online training, and on the other hand, this experience offers them an opportunity to improve their ICT knowledge.

CONCLUSION

In this work, the authors sought to understand whether continuing education based on online training “E-learning” affects the average score in post-training. The initial hypothesis was that “*the use of online training can facilitate and improve the learning outcomes of nurses.*”

The results concluded that online training influences the average post-training score of nurses. This suggests that some CE topics can be taught via e-learning platforms and can complement face-to-face training by allowing knowledge assessment at the level of each professional in the health

network.

Given these results, would it be appropriate for trainers to question their practice of continuing education in hospitals? Would it be relevant to recall the need to open other avenues of research in different hospitals exploring the factors influencing the acceptability of online training to better facilitate the integration of technology into the daily practices of the various health professionals?

LIST OF ABBREVIATION

CPD = Continuing Professional Development

LIMITATIONS

This research is limited to a small sample. Therefore, it would be interesting to confirm these results by using a larger sample or an exhaustive survey of all categories in the different hospitals with various themes in the context of other continuing education to ensure the generalization of the results to all health professionals in the hospitals.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The regional management of hospitals in the Casablanca-Settat region, Morocco, approved this study.

HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All the humans were used as per the guidelines of the Helsinki Declaration of 1975.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data sets used and/or analysed during this study are available from the corresponding author upon request.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to all the nursing staff and those in charge of continuing education in the various hospitals who participated in the realization of this experiment.

REFERENCES

- [1] Order of Nurses of Quebec, towards a culture of continuing education for the nursing profession in Quebec. Guidance document

2011. <http://www.deslibris.ca/ID/232418>
- [2] Mokhtar H. National Institute of Health Administration. INAS) Rabat Morocco Use of e-learning in continuing education in health: point of view of health professionals. 2008.
- [3] Pellerin N. The characteristics, context and processes of setting up and sustaining a professional development activity by a team of nurses. thesis submitted to the Faculty of Graduate Studies with a view to obtaining the degree of Master of Science (M Sc) In Nursing. 2015.
- [4] Marceau M, Talbot LR, Gallagher F. Development and evaluation of a continuing education activity adapted to trauma nurses. *Medical Pedagogy* 2013; 14(1): 27-38.
- [5] Gouifrane R, Belaouad S, Benmokhtar S, Radid M. The motivation of nurses to participate in continuing education actions: a descriptive study at the level of the surgical emergency department of Ibn-Rochd hospital of Casablanca. *Int Francophone J Nurs Res*. 2018 Dec 1; 4 (4): e237-43. Online (Bergh) [<http://dx.doi.org/10.1016/j.refiri.2017.10.006>]
- [6] Lhbibani A, Lotfi S, Tridane M, Belaouad S. Perception of e-learning in continuing education by midwives in hospital centers in the casablanca-settat region. *International Journal of Advanced Trends in Computer Science and Engineering Hassan II-Casablanca University (UH2C), Casablanca, Morocco* 2019; 8(1.4): 408-14. <http://www.warse.org/IJATCSE/static/pdf/file/ijatcse6381.42019.pdf> [<http://dx.doi.org/10.30534/ijatcse/2019/6381.42019>]
- [7] Maisonneuve H, Touboul C, Bonnelye G, Bertrand D. Continuing education for hospital practitioners: important but with organizational and financial difficulties. *Med Pr* 2008; 37(10): 1391-406.
- [8] Fenouillet F, Dero M. Is e-learning effective? An analysis of Anglo-Saxon literature. *Knowledge (Beverly Hills, Calif)* 2006; 12(3): 88. <http://www.cairn.info/revue-savoirs-2006-3-page-88.htm>
- [9] Gentizon J, Kottelat Y, Hamel-Lauzon G, Szostak V, Gallant S. Knowledge at the service of patients: evaluation of the transfer of knowledge to nurses, after e-learning training on pain management. 2019; 2: pp. (1)1-13. [<http://dx.doi.org/10.31770/2561-7516.1028>]
- [10] Phaneuf M. Yesterday's knowledge still valid tomorrow?. Quebec City: University of Montreal 2012. <http://www.prendresoin.org/?p=999>
- [11] High health authority. Lifelong professional development for allied health professionals 2014. <https://www.google.com/search>
- [12] Abbott FR, Mejía A, Organization WH. Continuing education for health workers: manual for workshops. Geneva: World Health Organization 1990. <http://apps.who.int/iris/handle/10665/39499>
- [13] Girard MC. The experience of acquiring client teaching resources and using them in clinical situations as perceived by nurses who completed an e-learning course: a descriptive qualitative study _2014_thesis 2014. Available at <https://papyrus.bib.umontreal.ca/xmlui/bitstream/handle/1866/11946>
- [14] Gonzalez PR. Implementation of e-learning for CHBA nursing staff 2018. <http://hdl.handle.net/2078.1/thesis:14048>
- [15] Stevens KR. The Impact of Evidence-Based Nursing Practice and Big Ideas. *Online J Issues Nurs* 2013; 18(2): 4. [<http://dx.doi.org/10.3912/OJIN.Vol18No02Man04>] [PMID: 23758422]
- [16] Vaona A, Banzi R, Kwag KH, et al. E-learning for health professionals *Cochr database system rev* 2018; 1: CD011736. <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD011736.pub2/full>
- [17] Good practice guide for e-learning stakeholders 2004.
- [18] Bea D, Alberta O, Amangali A, Wolter P. The development of an electronic platform to strengthen nursing care Kazakhstan: A systematic review and a Delphi study to define the requirements. *open nurs j* 2021; 2021(15): 156-69.
- [19] Messaoudi F. E-learning devices: what uses to improve training in Morocco? from the first national e-learning barometer to the case study of continuing education. Presented and supported by 2013; 330
- [20] Karaman S, Kucuk S, Aydemir M. Evaluation of an online continuing education program from the perspective of new graduate nurses. *Nurse Educ Today* 2014; 34(5): 836-41. [<http://dx.doi.org/10.1016/j.nedt.2013.09.006>] [PMID: 24080268]
- [21] European Commission. 2003. <https://ec.europa.eu/transparency/regdoc/rep/1/2001/FR/1-2001-172-FR-F1-1.Pdf>
- [22] Launay-Vacher G, Rieutord A. E-learning for pharmacist CPD: educational engineering, a key factor. *J pharm clin* 2014; 33(2): 76-02.
- [23] Ghirardini B. Food and agriculture organization of the united nations, Methodologies for e-learning course development. A guide to designing and developing digital learning courses. Rome 2012.

- [24] Guide to the Manual of Management of the Sanitary Circumscription. Ministry of Health. Rabat.Morocco 2014.
- [25] Kirkpatrick DL, Kirkpatrick JD. Evaluating training programs: the four levels. San Francisco: Berrett-Koehler Publishers 2006.
- [26] Le Boterf G. organization Engineering and evaluation of skills, Paris. Editions d'organisation 2006.
- [27] Bloom BS. Taxonomy of educational objectives. cognitive domain (translated by M.Lavallée).Montreal: Les Presses de l'Université du Québec 1979; 1.
- [28] Khatony A, Nayery ND, Ahmadi F, Haghani H, Vehvilainen-Julkunen K. The effectiveness of web-based and face-to-face continuing education methods on nurses' knowledge about AIDS: A comparative study. BMC Med Educ 2009; 41 <https://bmcmededuc.biomedcentral.com/articles/10.1186/1472-6920-9-41>
- [29] Laine A, Välimäki M, Löyttyniemi E, Pekurinen V. The impact of a web-based course concerning patient education for mental health care professionals: Quasi-experimental study. J Med Internet Res 2019; 21(3): e11198. [<http://dx.doi.org/10.2196/11198>]
- [30] Horiuchi S, Yaju Y, Koyo M, Sakyo Y, Nakayama K. Evaluation of a web-based graduate continuing nursing education program in Japan: A randomized controlled trial. Nurse Educ Today 2009; 29(2): 140-9. [<http://dx.doi.org/10.1016/j.nedt.2008.08.009>] [PMID: 18829141]

© 2022 Lhibani *et al.*

This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International Public License (CC-BY 4.0), a copy of which is available at: <https://creativecommons.org/licenses/by/4.0/legalcode>. This license permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.