The Effectiveness of E-Learning in Enhancing Neonatal Resuscitation Skills, Knowledge and Confidence of Undergraduate Nursing Students

Wafaa Elarousy1,2*, Ebtesam Abdulshakoor1, Ranya Bafail1 and Makiah Shebaili1
1College of Nursing - Jeddah, King Saud Bin Abdulaziz University for Health Science, Saudi Arabia
2Faculty of Nursing, Alexandria University, Egypt

Abstract

Background: In recent decades, the use of information and communication technologies (ICT) for educational purposes has increased, and the spread of network technologies has caused e-learning practices to evolve significantly. E-learning is used increasingly in healthcare professionals’ education. In higher education, audio and video productions prove effective in enhancing student-learning outcomes and increase student satisfaction.

Aim of the study: The purpose of the study is to investigate the effectiveness of e-learning in enhancing neonatal resuscitation skills, knowledge and confidence of undergraduate nursing students.

Material and methods: Forty undergraduate students who registered for Pediatric course from College of Nursing-Jeddah were recruited for the study. A single-blind Randomized Control Trial design was used. Nursing students of the control group allocated to the tradition method of demonstration and re-demonstration of neonatal resuscitation skills in nursing lab while the nursing students of the experimental have access to video about neonatal resuscitation in addition to the tradition method.

Results: The results of the current study revealed that the nursing students of the experimental group were more skillful and had more knowledge about neonatal resuscitation than the nursing students of the control group and the differences were not statistically significant. Moreover, it was found that the nursing students of the control group reported higher level of self-confidence than nursing students of the experimental group and the difference was not statistically significant.

Conclusion and recommendation: The results of current study revealed improvement in nursing students’ skills, knowledge about neonatal resuscitation but the differences was not statistically significant. Further researches are necessary with increasing the number of students and video-viewing frequency may affect the learning outcomes.

Background

In recent decades, the use of information and communication technologies (ICT) for educational purposes has increased, and the spread of network technologies has caused e-learning practices to evolve significantly [1,2]. E-learning or online learning is used increasingly in healthcare professionals’ education. There is no single agreed definition of e-learning, but it generally refers to internet based forms of learning, rather than face to face interaction and where traditional methods of learning are supported by online resources [3].

Sangra et al. [4] did a study to create an inclusive definition of e-learning that would be accepted by the majority of the scientific community and would also define the boundaries for future activity in this sector. In this context and after taking into consideration all experts’ comments and arguments, a preliminary definition of e-learning was prepared. The preliminary definition was as follows: “E-learning is an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning”.

In higher education, audio and video productions prove effective in enhancing student-learning outcomes and increase student satisfaction. Moreover, Apple Computer’s iPod and iPad are becoming a part of healthcare professional education and patient-centered care. Educause Center for Applied Research (ECAR) studies (2005) revealed that the vast majority of the student respondents own at least one computer and a cell phone. These technologies are used on a daily basis for studying, social interaction, and entertainment. Students are increasingly using a combination of cell phones, laptops and personal digital assistant (PDAs) and about 25% have wireless adaptors. Virtually all have access to the internet and the majority has broadband access. Furthermore, it was found that 64.1% of the students perceive that IT used in courses improves learning [5].

Virtual reality application is one of the interactive e-learning approaches which provide effective stimulating situations [6]. Researchers integrate it to other simulations and e-learning strategies on order to provide safe environments. Immersive of high-fidelity standardized virtual simulation allow the evaluators to evaluate the critical thinking, decision making in emergency situation, and skill performance which could enhance the nursing student abilities[7].

There are many advantages of e-learning. For learners, learning is self-paced and gives student a chance to speed up or slow down as necessary, convenient for students to access any time, any place, self directed allowing the students to choose content and tool. For
The aim of the study was to investigate the effectiveness of e-learning in enhancing neonatal resuscitation skills, knowledge and confidence of undergraduate nursing students.

Specific objectives

Specific objectives of the study were to:

- Analyze how e-learning made an impact on neonatal resuscitation skills, knowledge and confidence levels of undergraduate nursing students.
- Examine the differences between undergraduate nursing students exposed to neonatal resuscitation in nursing lab only and those who had a combination of nursing lab and e-learning.
- Was there a statistical significant difference in neonatal resuscitation skills between undergraduate nursing students who exposed to neonatal resuscitation in nursing lab only and those who had a combination of nursing lab and e-learning?
- Were there a statistical significant differences in the levels of confidence between undergraduate nursing students who exposed to neonatal resuscitation in nursing lab only and those who had a combination of nursing lab and e-learning?

Materials and Methods

Study setting

The study was conducted at King Saud Bin Abdul-Aziz University for Health Science-College of Nursing -Jeddah.

Study Subjects

The study included all students (40 students) who registered for Nursing Care of Children and Their Families course, during the second semester of academic year 2012-2013.

Inclusion criteria

- Registered students for Nursing Care and Child and Their Families course were eligible for the study.
- Students who were willing to participate in the study.

Exclusion criteria

Students who weren’t willing to participate in the study.

Study design

A single-blind Randomized Control Trial design was used. Through this design: control, manipulation and randomization applied to test the effectiveness of an intervention [16]. The purpose of blinding was to reduce the risk of ascertainment and observation bias.
Sample size

Two sections with 40 students were included in the study.

Sampling technique

Probability sampling techniques, simple random sampling, was used. The randomization procedure gives the randomized controlled trial its strength. Random allocation means that all participants have the same chance of being assigned to each of the study groups [17].

Once the list of students was developed, the Principal investigator randomly allocated the odd number in the list to experimental and students with even number in the list allocated to the control.

The teaching assistants, who assessed the student's skills, didn't know the students who were allocated in the experimental group.

Tools

Data collection was done by using the following tools.

Tool I

Demographic data: it was developed by the researchers and includes: students' age, education level, stream, GPA.

Tool II

Neonatal resuscitation checklist: A 20steps checklist to test students skills of practice neonatal resuscitation following the neonatal resuscitation guidelines which developed by American Heart association in collaboration with American Academy of Pediatrics [18]. Every step in the checklist was evaluated on a scale of zero for not done, to one for done.

Tool III

Knowledge test was developed by the researchers and included MCQ questions to test the knowledge necessary for performing the procedure for both groups, control and experimental.

Tool IV

Student self-confidence: A 7-item students self-confidence instrument was controlled to prevent their influence on the dependant variables as follows:

1. **Validity**: 
   - **Reliability**: 
     - The researchers confirmed that the students didn't expose to any information/training in neonatal resuscitation outside CON-J. Neonatal resuscitation procedure was selected because this is the first time to deal with this procedure.
     - The researchers did their best to prevent access of the video by students from control group by schedule the neonatal resuscitation on the second week of the semester and evaluate the neonatal resuscitation skills on the third week of the semester.
     - Data collectors were trained to ensure the standardization of data collection method.

2. **Ethical considerations**: 

   The researcher submitted the research proposal and questionnaire to the Research Committees of the CON-J for review and obtained a written permission to conduct the study.

   All the respondents were fully informed about the research purpose and the nature of the study. All respondents were required to indicate their willingness to participate in the study by signing a consent form and their right to withdraw from the study at any time.

   Confidentiality was ensured in this study. The questionnaire used for data collection was handled only by the research team.

Data management and statistical analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. Qualitative data were described using number and percent. Quantitative data were described using mean and standard deviation for normally distributed data. Comparison between different groups regarding categorical variables was tested using Chi-square test. When more than 20% of the cells have expected count less than 5, correction for chi-square was conducted using Monte Carlo correction. For normally distributed data, comparison between two independent populations was done using independent t-test. Correlations between two quantitative variables were assessed using Pearson coefficient. Multivariate liner regression was assessed.
Significance test results are quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level.

**Results**

Table 1 illustrates the demographic characteristics of nursing students. Their ages ranged from 20 to 29 with mean age of 24.55 (SD 2.64); 60% of them from stream II, 57.5% of them in academic level 4 and their GPA ranged from 2.08 to 4.34 with mean of 3.13 (SD 0.56). Students nurse who participated in the study neither had any knowledge nor attended any nursing activities about neonatal resuscitation.

Table 2 presents distribution of nursing students according to neonatal resuscitation skills. It was found that the majority of nursing students were able to practice the neonatal resuscitation procedure.

Table 3 illustrates nursing student’s knowledge about neonatal resuscitation. More than half of them decided the right action to resuscitate a neonate in a written scenario while the majority of them able to identify the duration of their action and the ratio of chest compression to ventilation (90% and 97% respectively). Three quarter of them answered the parameters used to revaluate the neonate and 80% of them were able to decide the second action for resuscitation within the same scenario while only third of them answered the time needed to assess heart rate.

Nursing students self confidence with neonatal resuscitation procedure presented in table 4. It was found that all of participants

<table>
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<th>No.</th>
<th>%</th>
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<tr>
<td>Age</td>
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<tr>
<td>20–22</td>
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<td>&gt;26</td>
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<td>Min. – Max</td>
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<td>Mean ± SD.</td>
<td>24.55 ± 2.64</td>
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<td>Academic Level</td>
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<td>4</td>
<td>23</td>
<td>57.5</td>
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<td>7</td>
<td>14</td>
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<td>GPA</td>
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<tr>
<td>Min. – Max</td>
<td>2.08 – 4.34</td>
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<tr>
<td>Mean ± SD.</td>
<td>3.13 ± 0.56</td>
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<tr>
<td>Did you have any knowledge about neonatal resuscitation</td>
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<tr>
<td>Yes</td>
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<td>0.0</td>
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<tr>
<td>No</td>
<td>40</td>
<td>100.0</td>
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Table 1: Distribution of nursing students according to demographic data.

Table 2: Distribution of nursing students according to neonatal resuscitation skills.
either agreed or strongly agreed regarding their ability to do the initial evaluation of the neonate, perform initial steps, and demonstrate chest compression by thumb method technique. Furthermore, the majority of them either agreed or strongly agreed regarding their ability to evaluate the neonate, perform positive pressure ventilation (PPV) and demonstrate chest compression by two finger techniques (97.5%, 95% and 95% respectively).

Table 5 presents distribution of experimental group according to using e-learning. It was found that 75% of nursing students in the experimental group watched the movie about neonatal resuscitation; more than half of them watched the movie three times and more and three quarter of them reported that watching the movie improved their neonatal resuscitation knowledge, skills, and self-confidence.

Comparison between experimental and control group according to their demographic characteristics illustrated in table 6. No statistical significant differences were found between experimental and control group in relation to their stream and GPA while the mean age of control group was higher than the mean age of experimental group and the difference was statistically significant. The results of the current study revealed the nursing students of experimental group were more skillful and had more knowledge about neonatal resuscitation than the nursing students of the control group and the differences were not statistically significant. As regards the self confidence of the control group was higher the self confidence of experimental group and the difference was statistically significant. As regards the self confidence of the control group was higher than the mean age of experimental group and the differences were not statistically significant. The Pearson correlation coefficients between neonatal resuscitation knowledge, skills and self confidence and nursing students’ age and GPA were calculated (Table 8). The correlation was not statistically significant for neonatal resuscitation skills, knowledge or self confidence and nursing students’ age and grade point average (GPA).

Comparison between Stream I and Stream II of experimental group according to their neonatal resuscitation Skills, Knowledge and Self-Confidence presented in table 9. It was found that nursing students of stream II were more skillful than nursing students of stream I while
nursing students of stream I were more knowledgeable than stream II but the differences were not statistically significant. Furthermore, the nursing students of stream II self-confidence reported more self-confidence than nursing students of stream I and the difference was statistically significant.

![Table 5: Distribution of experimental group according to using e-learning about neonatal resuscitation.](image)

Discussion

E-learning has several advantages, including the ability to access materials at any time in almost any place, which also permits interactive web seminars and conferences with participants who may be located far away from one another [20]. Web-based technologies are increasingly being used to create modes of online learning for nurses [21], a systemic review done by Rowe M et al. [22] about the role of blended learning (both electronic and face-to-face) in the clinical education of healthcare students concluded that blended learning has potential to enhance the development of a range of clinical competencies among healthcare students. These new formats need to be investigated whether they are superior to traditional teaching methods. So, the aim of the current study is to investigate
the effectiveness of e-learning in enhancing neonatal resuscitation skills, knowledge and confidence of undergraduate nursing students as their effect needs to be assessed in nurse education.

The results of the current study revealed that nursing students of experimental group were more skillful and had more knowledge about neonatal resuscitation than the nursing students of the control group but the differences were not statistically significant. This is may attributed to the limited time of exposure to the video as the researchers did their best to prevent access of the video by students from control group by schedule the neonatal resuscitation on the second week of the semester and evaluate the neonatal resuscitation skills on the third week of the semester for the purpose of the study then the video was available for all students before summative evaluation. On the other hand, Makhdoom N et al. [23] found that Blended learning (both electronic and face-to-face) was statistically significantly better than traditional learning in all types of examination: written, objective structured clinical and case scenarios in studying family medicine. In addition, Moor S et al. [24] studied the progress of an interactive online educational resource to develop the knowledge, skills and confidence of healthcare professionals working with people affected by mesothelioma and concluded that the online educational resources had positive impact on nurse’s skill, confidence and knowledge. Also, a study done by Sung YH, et al. [25] showed a significantly higher level of knowledge of medication and satisfaction with the comprehensiveness of their medication learning, but the self-efficacy of medication administration, medication-administration ability among participants experimental, blended group from that in the control group. Furthermore, the results of study done by Silva C et al. [20] concluded that students who participated in online discussion accompanying with face to face activities (blended learning) had significantly greater posttest scores than those who only participated in classes.

As regards the self-confidence of the control group was higher than the self-confidence of experimental group and the difference was not statistically significant. This is unexpected and attributed to that limited time of exposure to the video as the researchers did their best to prevent access of the video by students from control group by schedule the neonatal resuscitation on the second week of the semester and evaluate the neonatal resuscitation skills on the third week of the semester for the purpose of the study then the video was available for all students before summative evaluation. On the other hand, Makhdoom N et al. [23] found that Blended learning (both electronic and face-to-face) was statistically significantly better than traditional learning in all types of examination: written, objective structured clinical and case scenarios in studying family medicine. In addition, Moor S et al. [24] studied the progress of an interactive online educational resource to develop the knowledge, skills and confidence of healthcare professionals working with people affected by mesothelioma and concluded that the online educational resources had positive impact on nurse’s skill, confidence and knowledge.

Conclusion and Recommendation

The results of current study revealed improvement in nursing students’ skills, knowledge about neonatal resuscitation but the differences was not statistically significant. Further researches are necessary with increasing the number of students and video-viewing frequency may affect the learning outcomes.

Limitation of the study

Small number of nursing students, therefore, the results could not be generalized.

Acknowledgment

We would like to extend sincere appreciation to the nursing students who participated in the study.

References
