The Effect of Using Mobile Device with Quick Response Code on Academic Performance Amongst Pediatric Nursing Students

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ABSTRACT

Mobile devices are more powerful and portable nowadays with plenty of useful tools for assisting people handle daily life. Mobile technology and quick response (QR) codes have great potential to improve teaching and learning because mobile technologies enable learning across multiple contexts, through social and content interactions. **Purpose of the study**: The purpose of the study was to evaluate the effect of using mobile device with quick response code on the academic performance amongst pediatric nursing students. **Design**: A quasi-experimental research design was used to conduct the study**. Settings**: This study was carried out in clinical pediatric laboratory skills for third year students and teaching hall of Faculty of Nursing / Benha University. **Sample**: A purposive sample ١٨٠ pediatric nursing students from third year, were included. Systematic random sample was used to assign students into study and control group. Each group contained (٩٠) students. **Instruments**: Four instruments consist of three parts, **Instrument (١):** A structured interviewing questionnaire: to gather data in relation to characteristics of the study subjects, pediatric nursing student's knowledge regarding mobile learning**. Instrument (٢): Likert scale: attitude scale toward mobile learning;** To assess the pediatric nursing student's attitude toward mobile web quick response code. **Instrument (٣): An observational checklist sheet;** It was developed by the researcher in the light of relevant literature review to assess pediatric nursing students in clinical pediatric nursing skills**. Results**: The results showed that, that there was a highly statistically significant difference in knowledge, attitude and practice score for the studied student regarding mobile learning between study and control at post training as compared to pre of training implementation**. Conclusion**: the study was concluded that, the pediatric nursing students (study group) who utilized mobile devices with quick response code achieved a higher level of academic performance than pediatric nursing students(control group) who received traditional teaching (lecture, demonstration and redemonstration). **Recommendations:** The teaching staff should be use mobile device with quick response code technology such as guidelines for taking pictures and videos during lectures or clinical practices.

Keywords

Mobile devices, Quick Response codes (QR).

Introduction

A mobile device is “any device that is small, autonomous and unobtrusive enough to accompany us in every moment. Mobile devices also can be mediated to acquiring knowledge and skills through actions or interactions. Mobile learning three aspects can be specified for this type of learning: Mobility of technology, mobility of learning and mobility of learner. Mobility of technology focuses on examining the possibility of using portable and wireless devices such as mobile phones, laptops, and tablets for educational purposes **(Rahimia and Miri, ٢٠١٤).**

Mobile learning refers to a teaching and learning method that utilizes mobile devices to extend traditional teaching and learning and sustain high levels of student engagement with rich connections to other people and resources across different contexts. Learning can refer to the mental processes that lead to changes or outcomes in knowledge, behaviors, skills, attitudes and values. Learning can occur inside and outside the classroom and the learning situations can be either formal planned lessons or informal unplanned and spontaneous learning experiences (**Rikala, ٢٠١٥).**

The benefit of using mobile and wireless communication technologies to provide learners with learning supports and learning guidance for infield activities or in class activities. QR code can be applied to various practical applications such as science, nursing, medicine and social science learning and language courses. The mobile learning has been conducted all over the world, but only a small portion of the studies have addressed the use of QR codes in education. Because QR codes are versatile, they can support learning in different contexts **(Sung, et al., ٢٠١٦).**

Mobile learning facilitates the interaction between students and teachers in the classroom and allows the exchange of information outside the university. M-learning will not replace the traditional classroom or the electronic learning system, but it can work as additional support to complement and add value to the existing learning models **(Aish, ٢٠١٤).** Mobile devices are currently used to enhance or support learning in a graduate in order to facilitate student achievement. Information obtained from the students in order to provide suggestions on applications and web resources that can be accessed at little or no cost **(Megan and Mendez, ٢٠١٤).**

Quick response code (QR) is a special type of barcode than can hold more information can be retrieved and displayed quickly using the camera on a smartphone, android or a tablet device. QR Code is a two-dimensional barcode, which consists of black modules arranged in a square pattern on a white background (**McKee, ٢٠١٤)**. The QR code functions as a link between reality and the virtual world by allowing users to scan a printed object (via their phones' cameras), giving access to content such as a website, a video, etc. QR codes in education can be placed in the context of mobile learning. QR codes facilitate learning outside of classroom and learning materials are no longer limited to textbooks. There is a variety of ways to use QR codes in educational context. Teachers were cooperating in developing new ways to embed QR codes in learning **(Thayer, ٢٠١٢).**

Nursing learning environment is shared among a classroom, hospital, community and other educational settings. Particularly in clinical learning environment, students might encounter many challenges as they apply theoretical knowledge and practical skills gained in academic settings in health care settings. Therefore, mobile phone with QR technologies can be an important resource for clinical practice because of their accessibility. As well, their use is consistent with

the notion that clinical decision support is a core function of health information system. The nurse educators should explore the use of mobile phone with QR technologies to support nursing students in clinical training as they provide easy access to quality educational material at the point of care, especially the current generation of students has grown up encompassed by information technology (**Durak, etal., ٢٠١٦).**

Purpose

The purpose of the study was to evaluate the effect of mobile device with quick response (QR) code on the pediatric nursing students' performance in their learning experience, through the following:

١-Assesing knowledge, practice and attitudes of pediatric nursing students regarding mobile device with QR code.

٢- Implementing training course by using mobile device with QR code on pediatric nursing students

٣-Evaluate the knowledge of pediatric nursing students' after program implementation.

Hypothesis

Pediatric nursing students who use mobile devices (study group) will achieve a higher level of academic performance than pediatric nursing students (control group) who received traditional teaching (lecture, demonstration and redemonstration).

Definition of variables

Quick response code (QR)

QR code (Quick Response Code) is the trademark for a type of matrix barcode (or two-dimensional barcode). A QR code uses four standardized encoding modes (numeric, alphanumeric, byte and binary) to store data efficiently. A Quick Response (QR) code is a two dimensional barcode consisting of black modules (small squares) arranged in a square grid on a white background, which can be read

by an imaging device such as a camera in any mobile device connected to the Internet.

Subjects and methods

Research Design

A quasi experimental design was used in the current study (study and control groups).

Setting

This study was conducted in the accredited faculty of nursing / Benha University at both clinical pediatric laboratory skills for the third year/ pediatric nursing students and the teaching hall of the Faculty of Nursing.

Sample

A purposive sample of ١٨٠ pediatric nursing students from the third year, were included. Systematic random sample was used to assign students into study and control group. Each group contained (٩٠) students.

Exclusion criteria:

Students who received previous training in pediatric nursing course by using mobile device with quick response code.

Instruments

Instrument (١): A structured interviewing questionnaire:

It was developed by the researcher in an Arabic language after reviewing the related literatures, it included two parts:

Part I: Personal characteristics of the study subjects

Personal characteristics of the studied students include the following: age, sex, academic year, residence and previous training in pediatric course with mobile device with quick response code.

Part II: Pediatric nursing student's knowledge sheet

It was developed by the researcher in an Arabic language after reviewing the related literatures, it included two parts:

Part (One): Pediatric nursing student's knowledge about mobile device with quick response code

It was developed by the researcher to assess pediatric nursing student's knowledge regarding mobile learning include the following: previous using of mobile device, uses of mobile device, concept, reasons for use of mobile device, benefits, types and difficulties facing mobile learning.

Part (Two): Pediatric nursing knowledge test

This test was designed by the researcher based on review current literatures review to assess clinical pediatric nursing skills. It consists of ٤٠ questions that covered: Phototherapy, oxygen therapy, weight, height and drug administration. In form of multiple choices, true and false, filling the missing space and complete the following question.

Scoring system of the knowledge questionnaire

The studied students answers were compared with a model key answer, where ٢ scores were given for complete correct answer, ١ score was given for incomplete correct answer and ٠ score for wrong answer and unknown answer. According to the students' responses, their total level of knowledge was categorized as either unsatisfactory level (less than ٦٠٪) or satisfactory level (from ٦٠٪ to ١٠٠٪).

Instrument (٢): Likert rating scale for student attitude toward mobile device with QR; It was adopted from a standardized likert type rating scale by **Lynch et al., (٢٠١١).** It was used to assess the pediatric nursing student's attitude toward mobile web QR code. It included ١٥ questions.

Scoring system of the attitude

The responses of students' attitudes were classified into yes (٢), sometimes (١) and no (٠). The total scores of attitudes were divided into two levels as either negative attitudes (< ٦٠٪) or positive attitudes (٦٠ % ≤ ١٠٠٪).

Instrument (٣): An observational checklist sheet; It was developed by the researcher in the light of relevant literature review to assess pediatric nursing students in clinical pediatric nursing skills. It included ٤ procedures: phototherapy, oxygen therapy, drug administration (IM injection) and growth measurement (weight and length), According to the actual students responses, their total level of practice was categorized as either poor level (less than ٥٠٪), average level (٥٠٪ to less than ٧٥٪) or good level (٧٥٪ to ١٠٠٪).

Procedure:

١- An official permission to carry out the study was obtained from faculty dean of nursing; Benha University, explaining the purpose of the study and methods of data collection to take an approval for conducting the study.

٢- The data collection instrument was developed after a review of related literature including books, articles, periodicals and magazines to get acquainted with the various aspects of the research problem and to acquire the needed knowledge to conduct the study and prepare the necessary instrument.

٣- For validity assurance, the instruments were submitted to a jury of five experts in the field of pediatric nursing (٣ professors and ٢ assistance professors) to test face and content validity. Modification of the study tools were done according to the panel judgment on clarity of sentences, appropriateness of content and sequence of items.

٤- The reliability and internal consistency reliability of all items of the tools was assessed by using coefficient alpha. It was ٠.٩٤ for a structured interviewing questionnaire part ٢ to assess pediatric nursing student's knowledge regarding mobile device with quick response code, ٠.٨٣ for student's pre and post

questionnaire, ٠.٧٥ for instrument (٣) to assess attitude of pediatric nursing student's regarding mobile device with quick response code.

٥- A pilot study was carried out on ١٠ % of the total sample size (١٨ pediatric nursing students) over a period of two weeks to test the validity and applicability of the study tools and to estimate the time needed to fill the questionnaire. No radical modifications were carried out on the study tools so the study subjects were included in the study sample.

٦- For ethical considerations and human rights: The researcher explained the aim of the study to the pediatric nursing students and they were informed that the study is harmless. The researchers secured that all the gathered data are confidential and are used for the research purpose only. The students were informed that they are optionally allowed either to participate or not in the study and they have the right to withdraw at any time. An oral consent was taken from the students.

٧- Data were collected from the ١st October till the end of December ٢٠١٦, during academic year ٢٠١٦-٢٠١٧.The purpose of the study was explained by the researcher to all students (study and control groups) included in the study. Total number of pediatric nursing student in first term was (١٩٦), (٥) students refused to participate and (١١) student not have mobile phone. So the final total of study sample was (١٨٠) who agree to participate in the study them were ٩٠ as a study group and ٩٠ as control group. The study group divided into (٥ groups), each group consists of (١٨ students). The researcher interviewed each student. Initial individually assessment of student's knowledge and practice by using mobile phone device was carried out prior to training sessions using tool ١ and ٣. The training started by teaching the theoretical pediatric course for all students. In study group the theoretical pediatric course consist of definition, indication, equipment and procedure for each procedure and takes about ٣٥minutes for knowledge.

Theoretical part conducted in the ٣rd year pediatric nursing students' department class room and teaching hall take ٢ hours while the implementation of the practical part conducted in the affiliated nursing laboratory as previously mentioned.

Practical part: started by setting objective of mobile phone device based training, preparation of the content which covered the reason behind the application of the sessions: Phototherapy, oxygen therapy, growth measurement and drug administration (IM). Demonstration and redemonstration were conducted in ٢ sessions for each group in the clinical pediatric nursing laboratory skills, ٢ sessions per day/ approximately ٢ to ٣ day per week for ٢٠ days, the time of each session about ٤٥ to ٥٠ minutes, the time depending upon understanding and responses of the students. Students divided into groups (the group consist of ٥ students) to facilitate their training on the mobile phone device. Study group and control group take the same course. Each student takes about ١٥-٢٠ minutes, student was allowed to perform the steps of each procedure in the faculty clinical pediatric nursing laboratory skills under the supervision of researcher. The researcher was repeated procedures until the student mastered these skills. The evaluation phase, during this period the researcher observed the students' practice for pediatric clinical skills after using mobile device with QR through pre and post examination form and assessed their knowledge and attitude through students' self-administered questionnaire sheet.

Data analysis

The collected data were organized, tabulated and analyzed using electronic computer and statistical package for social sciences (SPSS) version ٢٠. Descriptive statistics were calculated for the data in the form of: Mean and standard deviation for quantitative data, and frequency and distribution for qualitative data. Also in analytical statistics, inter-group comparison of categorical data was performed by using chi square test ($\mathbf{X}^{٢}$ value). Also, Pearson correlation coefficient test was used. P value <٠.٠٥ was considered statistically significant (*)

while >٠.٠٥ statistically insignificant and P value <٠.٠٠١ was considered highly significant (**) in all analyses.

Results

Regarding to student age, all (١٠٠٪) of the study and control groups had age between ٢٠-٢٢ years old. In relation to student gender, the majority (٩٣.٣٪ and ٦٧.٨٪) of the study and control groups are female, less than three quarter (٦٧.٨٪ and ٦١.١٪**)** of the study and control groups were resident in rural area. In relation to previous uses of mobile device in learning pediatric nursing skills, all (١٠٠٪) of the study and control groups haven't used mobile device in learning. Meanwhile, more than three quarter (٨٢.٢٪ and ٥٧.٨٪) of study and control groups were used mobile device to download songs.

Table (١): Shows that, there was a highly statistically significant difference between study and control groups knowledge regarding mobile device with quick response code in post training as compared to pre training implementation **(P=<٠.٠٠١).**

Table (٢): This table presented that, there was a highly statistically significant differences between study and control groups in relation to their knowledge regarding pediatric nursing skills at post training as compared pre training (P<٠.٠٠١)**.**

Table (٣): Showed that, there was a highly statistical significant difference (P value <٠.٠٠١) between study and control groups in relation to their total knowledge regarding pediatric nursing skill favor study group.

Table (٤): This table presented that, there was a highly statistically significant differences between study and control groups in relation to all items of pediatric nursing practice (phototherapy, oxygen, length, weight and drug administration) at post training as compared to pre training ($\mathbf{X}^{٢}$=١٧٢, P<٠.٠٠١)

Figure (١): Reflects that, the majority (٩٣.٣٪) of study group had positive attitudes towards mobile device with quick response code in the post training in relation to control group.

Figure (٢): Showed that, the majority (٩٥.٦٪) study group had good practice towards pediatric nursing skills in the post training in relation to control group.

Table (٥): Showed that, there was a highly statistical significant difference (P value <٠.٠٠١) between study and control groups in relation to their total knowledge, practice and attitude score in post training.

Table (١): Mean and standard deviation of the studied student's knowledge regarding mobile with quick response code (pre/post n=١٨٠).

Item	Study group				Paired (t)	p	Control group				Paired (t)	p
	Pre- training		Post- training				Pre- training		Post- training			
	Mean ± SD		Mean ± SD				Mean ± SD		Mean ± SD			
Concept of mobile website QR code learning	.١٠٠٠	.٣٩٨٠٣	٢.٨٨٨٩	.٤٠٩٠١	.٠٧٦	.٩٤٠	.٠٠٠٠	.٠٠٠٠٠	.٠٠٠٠	.٠٠٠٠٠	٤٠.١٣٧	.٠٠٠
Reasons for using mobile website QR code	.٠٠٠٠	.٠٠٠٠٠	٥.٦٣٣٣	١.١٧٥١٢	٧.١٦٢	.٠٠٠	.٠٠٠٠	.٠٠٠٠٠	.٠٠٠٠	.٠٠٠٠٠	٤٠.١٣٧	.٠٠٠
Benefits of mobile website QR code	.٠٠٠٠	.٠٠٠٠٠	٧.٣٧٧٨	٢.٥٨١٦٠	٧.٩٨١	.٠٠٠	.٠٠٠٠	.٠٠٠٠٠	.٠٠٠٠	.٠٠٠٠٠	٤٠.١٣٧	.٠٠٠
Types of devices mobile website QR code	.٢٣٣٣	.٨٣٥٣٢	٧.١٣٣٣	١.٣١٧١٣	٩.٢٨١	.٠٠٠	.٠٠٠٠	.٠٠٠٠٠	.٠٠٠٠	.٠٠٠٠٠	٤٠.١٣٧	.٠٠٠
Difficulties facing the application of mobile website QR code	.١٣٣٣	.٧٣٧٤٤	٨.٦٣٣٣	٣.٢٤١٠٦	٨.٧٣٠	.٠٠٠	.٠٠٠٠	.٠٠٠٠٠	.٠٠٠٠	.٠٠٠٠٠	٤٠.١٣٧	.٠٠٠

Table (٢): Distribution of the studied students' knowledge regarding pediatric nursing skills at pre training and post training (study and control group n=١٨٠)

Items	Study group(No.٩٠)						X^2 test	p	Control group(No.٩٠)						X^2 test	p
	Pre training			Post training					Pre training			Post training				
	Correct and complete answer	Correct and incomplete answer	Don't know	Correct and complete answer	Correct and incomplete answer	Don't know			Correct and complete answer	Correct and incomplete answer	Don't know	Correct and complete answer	Correct and incomplete answer	Don't know		
	%	%	%	%	%	%			%	%	%	%	%	%		
Choose the correct answer	٤.٤	٢٣.٣	٧٢.٢	٧٠.٠	٢٢.٢	٧.٨	١٠٤.٣٤	.٠٠٠	١.١	١٧.٨	٨١.١	٥٧.٨	٣١.١	١١.١	١٠٦.٠٢	.٠٠٠
Complete the missing space	٢.٢	٣١.١	٦٦.٧	٧١.١	١٤.٤	١٤.٤	١٠١.٧٩	.٠٠٠	١.١	٣٠.٠	٦٨.٩	٦٥.٦	٢٠.٠	١٤.٤	٩٥.٢٨	.٠٠٠
Complete the following	٤.٤	٢٢.٢	٧٣.٣	٦١.١	٢١.١	١٧.٨	٨٠.٦٣	.٠٠٠	٣.٣	١٧.٨	٧٨.٩	٥٦.٧	٢٥.٦	١٧.٨	٧٩.١٨	.٠٠٠
True and false question	٠.٠	٢٤.٤	٧٥.٦	٧٨.٩	١١.١	١٠.٠	١٢٤.٧٤	.٠٠٠	٠.٠	١٨.٩	٨١.١	٦٧.٨	٢٢.٢	١٠.٠	١١١.٦٥	.٠٠٠

Table (٣) Total knowledge scores of studied students regarding mobile learning through the training phases (No ١٨٠).

Topic	Study group(٩٠)				Control group(٩٠)				X^2 test	p
	Pre training		Post training		Pre training		Post training			
	No.	%	No.	%	No.	%	No.	%		
Satisfactory	٢	٢.٢	٨٠	٨٨.٩	٠	٠.٠	٧٧	٨٥.٦	١٥٩.٥٦٤	.٠٠٠
Unsatisfactory	٨٨	٩٧.٨	١٠	١١.١	٩٠	١٠٠	١٣	١٤.٤		
Total	٩٠	١٠٠	٩٠	١٠٠	٩٠	١٠٠	٩٠	١٠٠		

Table (٤): Distribution of the studied students practice regarding phototherapy, oxygen, length, weight and drug administration, at pre and post training (study and control n=١٨٠)

Items	Study group(No.٨٦)					X^2 test	p	Control group(No.٨٦)					X^2 test	p
	Pre training			Post training				Pre training		Post training				
	Done correctly	Done incorrectly	Not done	Done correctly	Done incorrectly			Done incorrectly	Not done	Done correctly	Done incorrectly	Not done		
	%	%	%	%	%			%	%	%	%	%		
Phototherapy	٣.٣	٦.٧	٩٠.٠	٩٢.٢	٧.٨	١٥٥.٤٩	.٠٠٠	٢.٢	٩٧.٨	٨٣.٣	١٣.٣	٣.٣	١٦١.٥٣	٠٠٠
Oxygen therapy	٠.٠	٦.٧	٩٣.٣	٩٥.٦	٤.٤	١٧٠.٤٠	٠٠٠	٣.٣	٩٦.٧	٨٣.٣	١٤.٤	٢.٢	١٦٢.٤٣	٠٠٠
length	٠.٠	٤.٤	٩٥.٦	٩٥.٦	٤.٤	١٧٢.٠٠	٠٠٠	١.١	٩٦.٧	٦٦.٧	٣٠.٠	٣.٣	١٦٤.٥٣	٠٠٠
Weight	١.١	٤.٤	٩٤.٤	٩٣.٣	٦.٧	١٦٨.٠٤	٠٠٠	٣.٣	٩٥.٦	٨٥.٦	١١.١	٣.٣	١٥٩.١٦	٠٠٠
Drug administration	١.١	١٢.٢	٨٦.٧	٩٥.٦	٤.٤	١٦٤.٣١	٠٠٠	١٢.٢	٨٧.٨	٩١.١	٨.٩	٠.٠	١٦١.١١	٠٠٠

Figure (١): Distribution of the studied student's according to their total attitude toward mobile device with quick response code

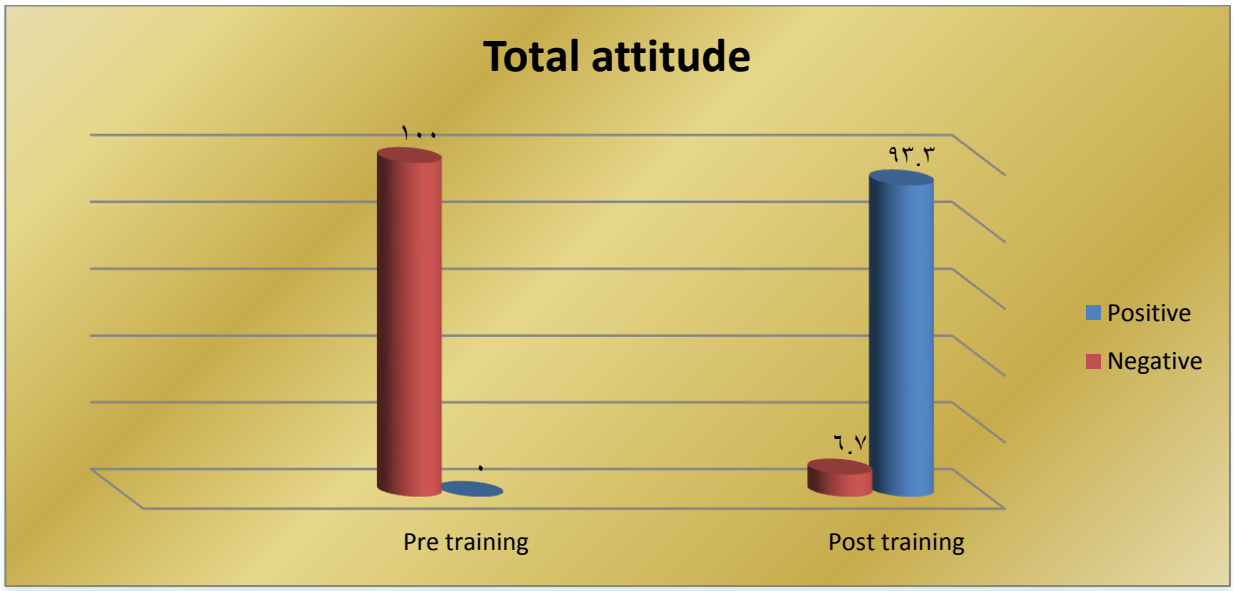

Figure (٢): Distribution of the studied student's according to their total practice

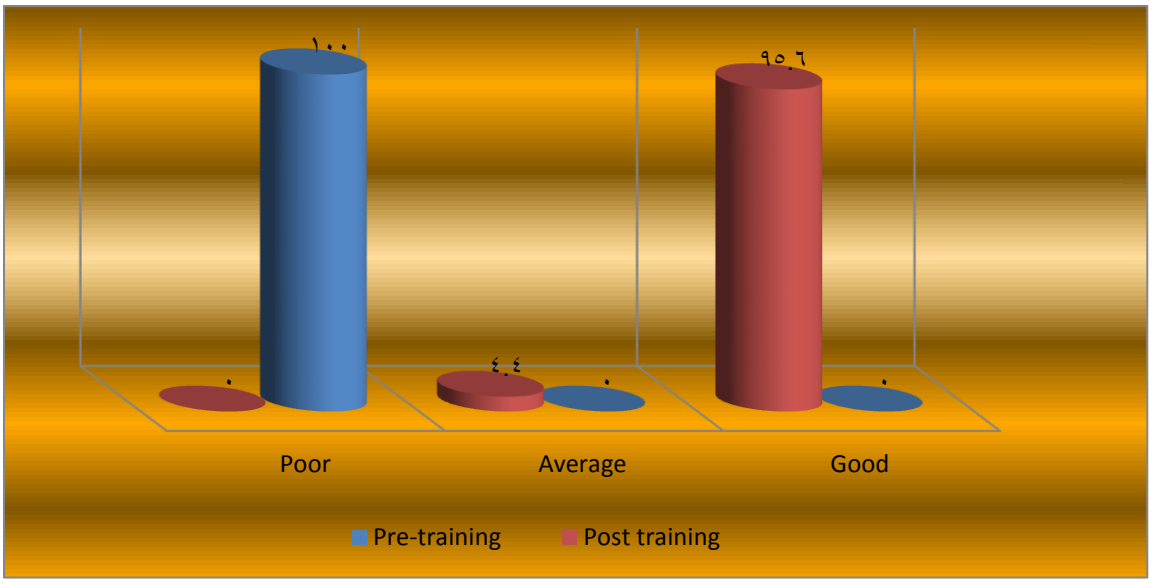

Table (٥) Total knowledge, practice and attitude scores of studied students regarding mobile device with quick response code during the training phases (No ١٨٠).

Topic	Study group(٩٠)				Control group(٩٠)				X^2 test	P value
	Pre-training		Post training		Pre-training		Post training			
	No.	%	No.	%	No.	%	No.	%		
Total knowledge score										
-Satisfactory	٢	٢.٢	٨٠	٨٨.٩	٠	٠.٠	٧٧	٨٥.٦	١٥٩.٥٦	.٠٠٠
-Unsatisfactory	٨٨	٩٧.٨	١٠	١١.١	٩٠	١٠٠	١٣	١٤.٤		
Mean ± SD	١٧.٨٨±		١٤.٢٣		١.٥٧٢٢		±.٤٩٦			
Total practice score										
Good	٠	٠.٠	٨٦	٩٥.٦	٠	٠.٠	٢٩	٣٢.٢	١٨٠.٠٠	٠.٠٠١
Average	٠	٠.٠	٤	٤.٤	٠	٠.٠	٥٨	٦٤.٤		
Poor	٩٠	١٠٠.٠	٠	٠.٠	٩٠	١٠٠.٠	٣	٣.٣		
Mean ± SD	١.٩٧±.٩٩١				١.٦٤±		.٧٤٤			
Total attitude										
Positive	٠	٠.٠	٨٤	٩٣.٣	-	-	-	-	٣٥٦.١٤	٠.٠٠١
Negative	٩٠	١٠٠.٠	٦	٦.٧	-	-	-	-		

Discussion

Technology has brought a lot of changes incorporating in education. Nursing educators needs to face these challenges by designing a new learning experience to practice in an altering health care environment. Mobile devices can enhance nursing students to learn content and improve how nurses practice to safe patient care **(Gapp, ٢٠١٥)**. The nurse educators should be explore the use of mobile with QR code technology to support nursing students in clinical training can enable student involvement and provide rich and rapid feedback **(Rahman, et al., ٢٠١٥)**.

Regarding to student age, the majority of the study and control groups are ranged between ٢٠-٢٢ years old. In relation to student gender it was found that, the majority of the study and control groups are female, less than three quarters of the study and control groups were reside in rural area, in relation to previous uses of mobile in learning nursing skills, it is found that, all of the study and control groups haven't used mobile phone device in learning. Meanwhile, the majority of study and control groups were uses mobile to download songs. This study a accordance with **Abd EL-Fattah, (٢٠١٧)**, which study titled "usage of smartphones technology in learning environment and it is effect on academic performance amongst nursing students, " who showed that, the studied sample age, (٥١.٤٪) of students their age ranged between (١٨-٢٥) years old, (٥٠.٩٪), there was a highly statistically significant difference between the frequency distribution of the study sample classified by age (P<٠.٠٠٠).With respect to studied sample' gender, there was a highly statistically significant difference between studied sample gender (P<٠.٠٠٠). Moreover, this study produced results which corroborate the findings of **Martin and Ertzberger (٢٠١٦)**, which study titled " effect of reflection type in the here and now mobile learning environment, " who illustrated that, most (٨٦٪) of the participants were female and ١٤٪ were male; ٨٧٪ were in the ١٨–٢٢ age range, ٨٪ were in the ٢٠–٢٣ age range and ٥٪were in the ٣٠–٤٠ age old.

Table (١): The results of the study showed that, there was a highly statistically significant difference in knowledge score for the studied student regarding mobile learning at post training between study and control as compared to pre training implementation**(P=<٠.٠٠١).**This finding of the study in a concurrence with **Raman, (٢٠١٥),** which study titled " mobile technology in nursing education ," who illustrated that, all of the students (١٠٠٪) being very knowledgeable in the use mobile web QR code. All students were easy scanning QR codes, ٩٠٪ they found the QR codes to be more helpful than traditional text book pictures. Students in the study group indicated high levels of total engagement of ٧٩.٨ (≥٦٦.٥, highly engaged), with a mean score of ٤.١٨ (>٣.٤, highly engaged). The highest mean (SD) scores for the engagement subcomponents were emotion, followed by performance, skills and participation. In the line of this study accordance with **Law. and So, (٢٠١٠),** which study titled" QR codes in education ," who showed that, more than ٩٠٪ (n = ١٥) had desired to continue using QR technology in the classroom. In addition, ٩٨٪ thought that the codes covered the necessary information and beneficial in the clinical setting. All of the students had satisfaction with QR codes as a learning activity, most (٩٢٪) indicated that, they were strongly satisfied with the exercise.

This result has been support the findings of **Zurmehly and Adams (٢٠١٧)**,which study titled " using quick response codes in the classroom, " who reported that, students scanning QR codes was easy and felt that the QR codes helped improve their learning of cardiac rhythm strips and feeling most engaged when course work activities could be applied to real-life situations.

This may be attributed to all students from children till college enters lecture and using textbook for studying.

Table (٢): This table presented that, there was a highly statistically significant differences pre and post training in relation to all items of pediatric nursing skills (P<٠.٠٠١)**.** In this context **Chaves, (٢٠١٥),** which study titled" an investigation of the effects of smartphone technology characteristics on nurses

perceived usefulness and attitudes towards using smartphones for work ," who mentioned that, in nursing education smartphone technology can be used for a quick access to course content, educational materials and guidelines during clinical procedures, classes and acquire information related to students' performance. Each student academic success to determined by their performance during classroom tasks, demonstrations and examinations ideas, skills and knowledge of student and planned grade clearly indicate the performance of a student.

On investigating student attitude, the majority study group has positive attitudes towards mobile learning in the post training in relation to control group.

This result has been support by the findings **De Pietro, and Fronter, (٢٠١٢),** which study titled " mobile tutoring for situated learning and collaborative learning in AIML application using QR-code, " who showed, the mobile devices in learning have positive effect on students' clinical learning in medical sciences education. In general, there were several instances of positive effects of mobile learning utilization on clinical learning of students. The fields that were affected by mobile learning included nursing process, catheterization, drugs calculation, maintain infant airway, intramuscular injection and chest tube insertion.

Table (٥): This study revealed that, there was a highly statistical significant difference (P value <٠.٠٠١) between study and control groups in relation to their total knowledge, practice and attitude score favor post training. This study accordance with **Koohestani, et al. (٢٠١٧),** which study titled " The educational effect of mobile learning on students of medical science, " who explored that, the effects of mobile learning intervention on students' knowledge of the nursing students in nursing process and improvement of their learning. In this context, **Guo, et al. (٢٠١٥),** which study titled" An integrative review of the impact of mobile technologies used by health care professionals to support education and practice ," who mentioned that, the integration of mobile technologies in nursing curricula allowed students to actively participate in different learning contexts and

reinforce learning at any time or any location. This participation has the potential to increase student achievement, make student attitudes more positive and lead to authentic learning activities that are indicative of the potential benefits derived from here and now mobile learning. Mobile devices assist learners to focus their attention on the context of the learning environment. Meanwhile, **Jabbour, (٢٠١٤),** which study titled" an analysis of the effect of mobile learning on Lebanese higher education, " who indicates that, the learner had a positive attitude toward the use of mobile devices with QR code in the classroom. The regular use of technology improved the level of student comfort and satisfaction in using technology. The use of mobile technology in the classroom have an effect on students' motivation to learn and achievements.

This study accordance with **Kivisto, (٢٠١٧),** which study titled" nursing students' experiences in learning with mobile technology, " who showed that, improvement in nursing practice happens as the student can use mobile technology. Most of the positive experiences and feelings aroused from the device benefits which these then together enabled learning. Motivation towards learning enhances as they feel comfort using mobile technology. Thus, offering the students with mobile technology learning tools has a great chance to improve learning and future practice.

These results are consistent with findings **Joyce and Kellie,(٢٠١٧),** which study titled" using quick response codes in the classroom, " who explored that, using mobile technology can be enhance clinical knowledge. Mobile technology use and including QR codes are increasing in general collegiate classrooms. Overall, the use of QR codes was a creative and positive way to integrate technology into the classroom to provide students with instant positive feedback. Nursing educators should consider incorporating newly emerging technologies that support student development of clinical reasoning skills to facilitate higher levels of learning. The QR codes served as a cost-effective learning aid to supplement student learning

This study accordance with **Lai, and Wu, (٢٠١٢),** which study titled" supporting nursing students' critical thinking with a mobile web learning environment, " who illustrated that, the use mobile device and web-based applications for clinical skill education has increased learner satisfaction compared with the conventional education methods. The use of mobile-based video clips in nursing skill education may also enhance accessibility to these videos and ultimately improve learning outcomes. Use of mobile devices in education highlights the transition from educator centered teaching to learner centered education

Conclusion

Based on the results of the present study, the study was concluded that, The mobile website QR code as a learning tool can help students to achieve or perform well. The pediatric nursing students gain good knowledge and improve their practice skills and attitude by using mobile with QR code.

Recommendations

Based on the Findings of the Current Study, the Following Recommendations were deduced

• The nursing staff should be create specific strategies for using mobile with quick response code technology such as guidelines for taking pictures and videos during lectures or clinical practices.

• Nursing educators ought to design educational methods, activities, and material that are appropriate for mobile with quick response code technology.

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