ORIGINAL ARTICLE

Development of Midwifery Emergency Curriculum by the Clinical Case-Based Crossword Games simulation and learning in midwifery students

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ABSTRACT

Background: Midwife, as the first person who is in contact with mother and the newborn in healthcare centers, should have the capability of early diagnosis of pregnancy and a high-risk labor.
Aim: To develop the midwifery emergency curriculum using clinical Case-Based Crossword Games simulation and also by evaluation of learning in midwifery students.
Methods: The present study was a quasi-experimental study with a control group that was performed inmidwifery groups of Islamic Azad University, Jahrom branch. In this research, the effect of electronic puzzle game simulation onthe knowledge and performance was assessed andthen compared with a parallel group in 2 concurrent years. In order to evaluate the satisfaction, the interview with the target group and the open-ended questions were used, and the results were then analyzed. Finally, the obtained data were analyzed using SPSS version 23.
Results: it was shown that, knowledge of theintervention group increased more than the control group**.** The mean of practical score increased in the experiment group from (5.95 vs 8.03), which was statistically significant (p-value <0.05). The students were satisfied with the use of educational game, and considered it as a happy, profound, and effective way of learning, since it reinforces theirs sense of dominance and effective learning.
Conclusion: According to the obtained results, using educational games can be recommended for educatingthe medical science groups.
Keywords: Midwifery, Medical Education, Game, Emergency course, technology, learning, performance, teaching, Learnings

INTRODUCTION

Midwives are known asimportant members of the medical community whose goal isto improvethe mother and newborn health, and to play their roles as the skilled and active members. So, training of this group isof special importance. Nowadays, the midwives' training is a topic of discussion in many countries worldwide, and in this regard, one of the primary educational requirements is to adopt new policies and methods to empower and improve midwives' performance[1]. Certainly, the clinical environment,especially delivery room,is an important part of the clinical environment in which the students learn to integrate theory with practice, and it isalso an essential resource for the students to be prepared for playing their professional roles[2]. Medical science education is associated with the complexities of a theoretical and clinical learning environment. Accordingly, to achieve a successful and efficient trainingbesides dynamic qualitative and quantitative developments of medical sciences fields,an effective curriculum should be provided with a contextto improve the efficiency of education[3]. In recent decades, as the process of education becomes more practical, educational technology growth, and increase in the significance of values in medical ethics (including respect for the patients and the least damage during learning); the traditional methods have been questioned[4]. Today, using different kinds of educational plays is one of the effective andenjoyablemethods that can be used for education[5]. Also, learning through games has many advantages. Accordingly, one of the most important advantage is an inherent reward originated from this method. Since this method is simple and understandable; it can enhance the learning persistence[6]. In a study by Baid et al., it has been reported that, using this method in medical education is also associated with different advantages including the active stimulation of learning and also improving the student's understanding. Moreover, this method provides the opportunity for the students to interact, participate, and enjoy the class[7]. Therefore, according to the importance of active strategies in learning and the students' retention, the importance of the midwifery field, which is associated with endangeringmother and fetus health,is highlighted. According to the daily increase of technology in all aspects of life, by considering alarge amount of printed and electronic resources of available information, it is necessary to learn using technology, and also by its positive effect on education. Another point to be considered is the habit of using traditional training, and also its major disadvantages in some cases such as lack of teacher-based deep learning and not paying attention to the attractions and the effects of technology onthe educational environment. In fact, using technology in education can create a user-friendly environment in terms ofthe individual's needs and may provide a qualitative optimization of teaching and learning with a context for constructive learning and student-oriented approaches. Therefore, this study was conducted with the aim of designing, developing, and evaluating thecurriculum of midwifery emergency (by considering its importance) in clinical-case basedcrossword game for the midwifery students of Islamic Azad University of Jahrom in 2018-19.

The purpose of this study was examining the design, development, and evaluation of the curriculum of midwifery emergencies in clinical-case based crossword games. Data were analyzed using SPSS version 24. To achieve the research objectives, the data were collected and then analyzed)

METHODOLOGY

The present study was a quasi-experimental one, which its process was performed in two phases of qualitative designing of the course and the scenarios and quantitative phases forthe evaluation of the effect of intervention on the students. The groups of gynecologists and midwives in medical education were enrolled as experts, to validate questions, number of students, anddimensions and relevance of them. After being certified by the Research and Ethics Committee of Shiraz University of medical sciences, this study aimed at designing, improving, and evaluating themidwifery emergency curriculum by a clinical-case based crossword game in 2018-2019. 40 midwifery students of the Islamic Azad University of Jahrom from one class under research training were conveniently sampled; therefore, the whole class was included in the study census.

Inclusion criterion was studying the midwifery and students' consent to participate in the study. The exclusion criteria were also dissent and leaving the study. The students' learning in two levels of knowledge and performance was compared to a group of studentsfrom previous year under similar conditions. Also, the descriptive and analytical statistics were used for data analysis. In addition, satisfaction evaluation from focus group interview and open-ended questioning was performed, and the results were then analyzed. In this research, at first, we consultedwith a specialized and academic technical team for necessary advice about the methods. Afterconsidering the feasibility, a clinical-case based crossword puzzle game was designed and then proposed in the midwifery emergency lesson. Theapp was designed in two phases of technical design, as well as considering the standard educational criteria. Technical design was different crosswords in game frameworks by electronic based in web. In designing educational games, we attempted to consider the educational needs of a midwifery student atthe professional level. Therefore,the goals provided a comprehensive dominance on training the subjectsand helpin reminding the important outlines of pregnancy, labor, and midwifery emergency, which are known as the important parts of midwifery lessons (must be learned in course). Furthermore, to provide the content validity of the subjects (relevance and proper coverage of all contents), we consulted for the contents with two gynecologists teaching midwifery lessons in this group. Content edition according to the training schedule, was another intended situation; so that, the educational needs could be optimally achieved. In order to decrease the costs and increase the users, we exploited an android-based web App, so the users can utilize the game by their smart phones through internet connection. Android App web design also allows a large number of users to have access to the App with alow cost. In android designing App, the mechanisms including feedback, score observation, and true-false feedback were utilized ; so instant learning was provided in the educational environment (feedback and score monitoring elements). The technical features of the design were the presence of a management panel to observe the student's academic level and providing a good output from the student's learning level. Afterward, there were two sections of the user panel in the technical section (playing game, challenge, feedback, score and number of correct sections, and then the correct answer). Panel of manager is observing the score and also the performance of the users to enable the educational interventions through this section. Accordingly, the above-mentioned sections in addition to provide the standard indexes for educational game design includes a standard framework for personalized learning and tailored to individual differences by constructive approach. Accordingly, thisplays an important role on the students' learning and the received feedbacks besides developing theirknowledge. It may also affect the students' performance, which was considered in this program. Student learning was also assessed by comparing the final scores of midwifery emergency of previous year students who were trained traditionally and through lectures. Although this method is not free of bias in the perspective, it can be sometimes considered as the best option in terms of the specific conditions and non-overlapping units in comparison. Therefore, by comparing the previous year group, it was considered in comparison to learning. It also minimizes the impact of group interference and the small volume of group divisions.) (Fig. 5)

Comparison of theoretical score between the two traditional and intervention groups: Data normalization was analyzed using the Shapiro-Wilk statistical test. The obtained results showed that, the significance level of difference between the traditional and intervention groups was more than 0.05. According to table 2, the paired t-test showed that, the mean theoretical score in the traditional group increased from (14.06 vs 21.59), which was statistically significant (p-value <0.05). Moreover in the intervention group, the mean theoretical score was (15.46 vs 26.46) after the intervention. Also, this increase was statistically significant (p-value <0.05). In addition, the results of the independent t-test showed that, there was a statistically significant difference between the two traditional and intervention groups during the study period. The results showed that, despite the increasing and significant scores of the two groups, the mean of the increase in score in the intervention group had a higher value (Table 1).

Table 1: Comparison of theory scores between the traditional and intervention groups at different times(score from 30 multiple choice questions)

Group/theory	Traditional group		Intervention group	
	Mean	SD	Mean	SD
Before intervention	14.06	2.11	15.46	2.47
After intervention	21.59	5.46	26.46	4.77
Score difference	-7.52		-10.99	
Paired t-test	10.53		16.99	
p-value	0.001		0.001	

Independent t-test: 3.599, P value:0.001

Comparison of the students' practice between the two traditional and intervention groups: Data normalization was analyzed using the Shapiro-Wilk statistical test. The results showed that, the significance level of difference between the traditional and intervention groups was less than 0.05. Also, nonparametric tests were used to evaluate the hands-on score.According to Table 3, the Wilcoxon test showed that, the mean score of the students' practice was(5.83 vs 4.84), which was statistically significant (p-value <0.05). In the intervention group, the mean theoretical score increased from (5.95 vs 8.03) after the intervention, which was statistically significant (p-value <0.05). In addition, Mann-Whitney test results showed that, there was a statistically significant difference between the two groups in terms of the practical score during the study .Also, the intervention group scores increasedin the practical level(Table2).

Table 2: Comparison of the practical score between the traditional and intervention groups at different times(score 10 from checklist performance test)

	Traditional group		Intervention group	
	Mean	**SD**	**Mean**	**SD**
Before intervention	5.83	1.76	5.95	1.50
After intervention	4.84	1.30	8.03	1.48
Score difference	0.98		2.07	
Paired t-test	8.27		20.01	
p-value	0.001		0.001	

Mann-Whitney tests: -6.495, P value: 0.001

Comparison between the App scores and practical scores of the two groups after intervention: Data normalization was analyzed using the Shapiro-Wilk statistical test. The results showed that, the significant level of post-test scores in the traditional and intervention groups was more than 0.05.Analysis was used to examine the mean of different groups in three categories (poor, moderate,and good from observer).The results also show that, in the intervention group, the mean score of the App was similar in three groups (poor, moderate, and good) (p-value >0.05). The results show that, the mean scores of the intervention group at moderate and good levels increased compared to the traditional group (Table 3).

Table 3: Comparison of the practice scores in different groups after intervention

Variable	**Traditional group**		**Intervention group**	
	n	**%**	**n**	**%**
Practice				
Poor	24	60%	4	10%
Moderate	13	32.5%	16	40%
Good	3	7.5%	20	50%
P value	0.001		0.004	

Investigating the relationship between the App, theoretical, and hands-on scores after intervention: According to Table 4, the results show a significant relationship between the App score and the hands-on score (p-value <0.05).

Table 4.Investigating the relationship between App, theoretical, and practice scores after intervention

Variable	**Theoretical score**	**App score**	**Practical score**
Theoretical score	1		
App score	0.074	1	
Practice score	0.045	0.307*	1

* Significant in 0.01

Figure 1: The first page of puzzle app

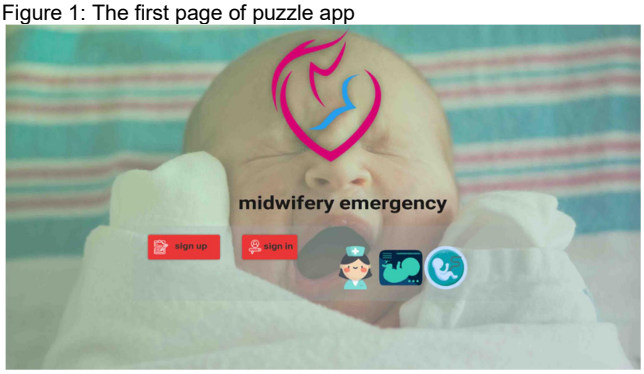


Figure 2:Number of the cases in user pages

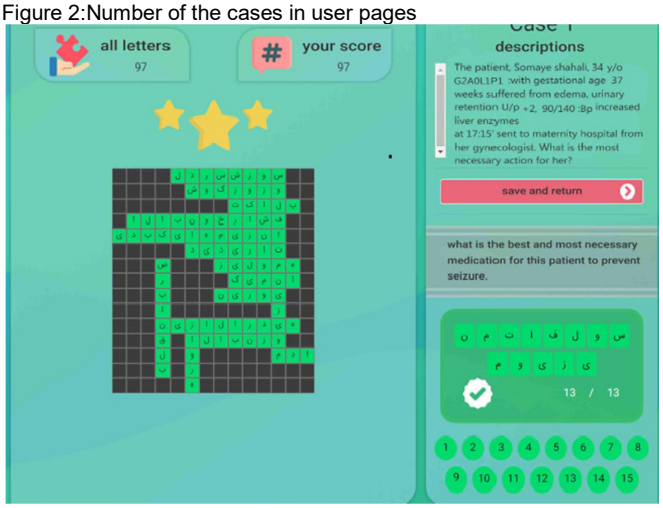


Figure 3: Case and cross word tables in game

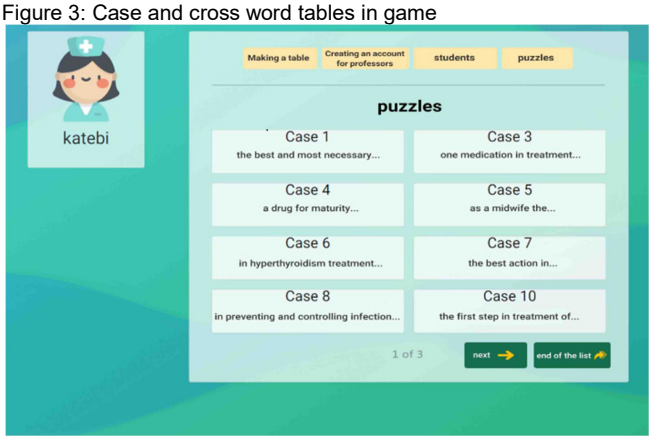


Figure 4: Cases in app and choice of cases for starting the game

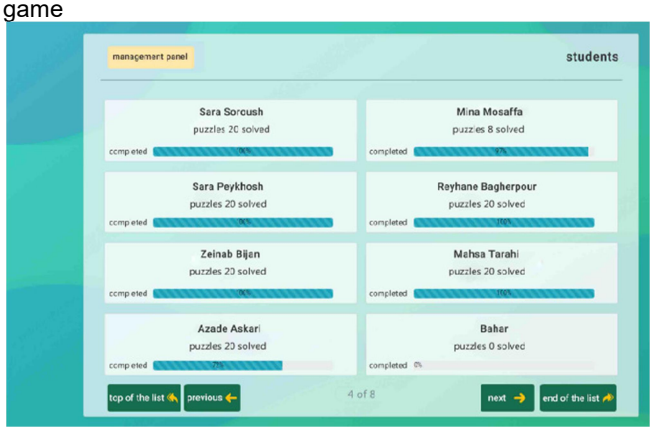
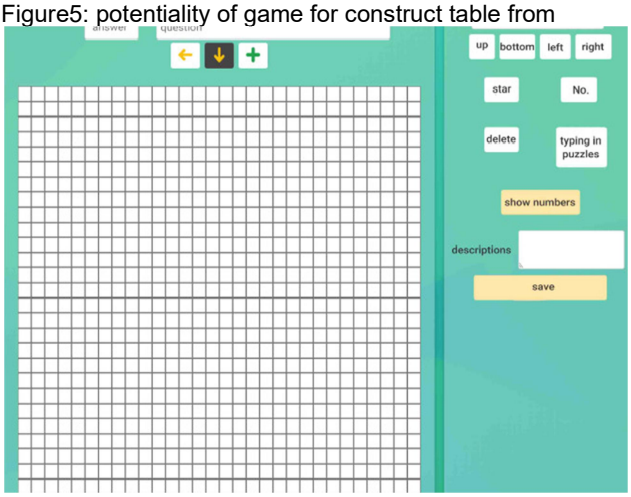


Figure5: potentiality of game for construct table from



DISCUSSION

Educational games facilitate a context to achieve from new tothe first experiences byproviding anenjoyable and attractive environment[8]. The purpose of the present study was designing, developing, and evaluating the midwifery emergency curriculum (by considering its importance) in a framework of clinical-case based crossword game amongthe midwifery students of the Islamic Azad University ofJahrom in 2018-2019. Based on the results of the present study, and by comparing the hands-on scores between the two traditional and intervention groups, the results show that the mean score in the traditional group decreased from 5.83 prior the study to 4.84 after performing the intervention, which was statistically significant (p-value <0.05). In the intervention group, the mean hands-on score increased from 5.95 prior to the study to 8.03 after performing the intervention, which was statistically significant (p-value <0.05). The results of O'Leary's study,by comparing satisfaction and learning through using the traditional method and educational games in teaching ectopic pregnancy showed that, the students' scores were higher than the traditional method, and student engagement to enjoy learning in this method was more than traditional methods[9]. The Bhoopathi study aimed at reviewing the impact of using the educational games on mental health lessons. The results of the comparisons of the analysis showed that, the students' scores increased to 10% by applying the game strategy, the amount of which shows 6 points higher related to the control group[10]. Boeker et al., in the study of the impact of game-based e-learning as an intervention study, reported that, e-learning students performed significantly better on the cognitive test than the students in the other group[11]. Luchi et al., in their study, investigated the effect of an educational game on the students' learning in action potentials. In all experiments, the students who played the gameperformed better in the assessments[12]. Lee and Hammer's (2011) have shown that, educational play can be considered as effective on the students' learning, and also enhances the students' problem-solving skills in a complex way; since the book contents are not very similar with the real world, reading it cannot engage the students with real issues, so these students are afraid of facing real issues. However, in the present study, with the engagement of the students through the game, we observed a significant increase in his hands-on score, especially in the intervention group.Theoretically, although both groups showed an increase in the scores, the increase was greater in the intervention group. Furthermore, it worth noting that, there was a significant relationship between the App and the hands-on scores (p-value <0.05); and the mean scores of the intervention group at moderate and good levels had an increasing trend compared to the traditional group. Therefore, combining the training with educational games can raise some fundamental challenges at academic and educational levels including motivation, interaction, and collaboration betweenthe learners to enhance their performance[15,14]. Nicola Whitton (2010) in his book of Digital Games and Learning stated that, puzzle games are more suitable for learning and reminding contents of the facts[16]. Also, Wilson et al., in 2009, in an article entitled "Matching the Elements of Digital Games and Learning Objectives", explained that, puzzle games are ideal for learning the expressive knowledge and facts[17]; which is compatible with the results of the present study.The intervention group scores at intermediate and good levels indicated significant increasescompared to the traditional groups.

Another study showed that, game in education have efficacy, can improve learning, and bring deep understanding of concept[18-23].

Overall, review of articles showedthat, a game-based learning approach may beeffective on facilitating the students, and ready them for 21st century skill development[24].

CONCLUSION

According to the results of the present study, using mobile-based puzzle games besides their availability can provide a context for the effective use of technology in the field of learning and changing the learning environment. If this method follows the technical educational standards based on numerous articles associated with fun and attractive learning, it can affect learning and retention and fulfill better education outcomes that are currently concerns to all medical education policymakers.

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