

Designing a Virtual-Social Learning Environment for Awareness about Diabetes and its Effectiveness on the Knowledge and Self-efficacy of Male Students' Mothers

Mohammad Ali Sehati^{1*}, PhD;  Mohammad Mirabi², PhD; Seyed Hasan Mortazavi Zarch¹, PhD; Mohsen Sardari Zarchi¹, PhD; Lancy D'Souza², PhD

¹Department of Computer Engineering, Faculty of Engineering, Meybod University, Meybod, Iran

²Department of Industrial Engineering, Faculty of Engineering, Meybod University, Meybod, Iran

³Maharaja's College, University of Mysore, India

ABSTRACT

Background: Diabetes is a type of metabolic diseases whose common characteristic is the increase in blood sugar. It is dangerous and very common in the world, especially in Iran. Research on people's awareness of this disease is scarce. The purpose of this study was to design a virtual-social educational environment for awareness of diabetes and its effectiveness on the knowledge and self-efficacy of male students' mothers.

Methods: Multi-stage cluster sampling was used and a total of 30 mothers were selected. These mothers were divided into experimental and control groups. (Each group involved 15 people). A pretest of knowledge about diabetes and self-efficacy was given to all mothers qualified for the study. All mothers in the experimental group were given diabetes training in 12 sessions, and the control group did not receive any training. For data analysis, descriptive statistics, mean, frequency and standard deviation were used at the end of the training sessions. Covariance analysis was used in inferential statistics using SPSS version 25.

Results: The results of the hypothesis review through covariance analysis indicate that the special virtual-social learning environment for diabetes awareness has an impact on the knowledge and Self-efficacy of Male Student's mothers and has increased it at a significance level of 1%.

Conclusion: It was concluded that that the virtual social-educational environment raises people's awareness of diabetes. Similar studies are recommended for other organizations like high schools, universities, public and private sectors. These studies can have a positive effect on psychological health of society.

Keywords: Virtual social-vocational educational environment, Knowledge about diabetes, Knowledge, Self-efficacy

**Corresponding author:*
 Mohammad Ali Sehati, PhD;
 Department of Computer Engineering, Faculty of Engineering, Meybod University, Meybod, Iran
 Tel: +98 9133559564
 Email: masehati@meybod.ac.ir

Please cite this paper as:
 Sehati MA, Mirabi M, Mortazavi Zarch SH, Sardari Zarchi M, D'Souza L. Designing a Virtual-Social Learning Environment for Awareness about Diabetes and its Effectiveness on the Knowledge and Self-efficacy of Male Students' Mothers. Interdiscip J Virtual Learn Med Sci. 2020;11(1):54-60. doi: 10.30476/ijvlms.2020.84589.1013.

Received: 23-12-2019
 Revised: 17-03-2020
 Accepted: 18-03-2020

Introduction

A healthy family is a family that manages the relations among its members, especially parents and children. In order to secure a healthy relationship, there are principles and practices that parents, especially mothers should follow. They need to have the necessary knowledge and skills to establish their educational roles based on these principles of spiritual and intellectual bonding. One of these skills is self-efficacy. Parental self-efficacy is an important cognitive structure in relation to parental performance. Parents need knowledge and information on effective childcare methods in order to feel self-efficacious and to reduce physical and mental ailments.

Effective education can play a significant role in reducing diseases and complications and, as a consequence, improving mothers' health because education is one of the key pillars of developing abilities, skills and competencies in different parts of society (1, 2). In this regard, the advancement of information technology has led to the emergence of new approaches in education such as e-learning. The use of e-learning in a flexible educational system provides a good opportunity for expanding scientific content and increasing the depth of learning; it can be one of the most important ways of responding to the growing educational requirements for handling diseases.

Education can be especially effective in dealing with some widespread diseases such as diabetes. The statistics in Iran indicate that we have always ignored the issue of information and prevention, and there has never been a serious, effective and continuous program to prevent many chronic diseases such as diabetes (3, 4). There are limited studies in Iran about the public awareness and self-efficacy in tackling diabetes. Also it is known that there is a high rate of diabetes

in Yazd province.

All of these reasons encouraged us to design a virtual socio-educational environment to raise awareness of diabetes and its effectiveness on knowledge and self-efficacy of mothers in Yazd. The purpose of this study was to evaluate its effectiveness on knowledge and self-efficacy of male student's mothers in primary schools in district 1 of Yazd. We sought to determine the effectiveness of awareness about diabetes on the mothers' resistance to obstacles in confronting the disease.

Methods

This study involved experimental and control groups, and was conducted using pretest and posttest. In this research, the experimental and control groups were evaluated twice, once before the start of training and once after completing the training. The diagram of the research is shown in Table 1.

Samples and Setting

The statistical population included all mothers of male students in district 1 of Yazd in 2017-2018 educational year. The number of mothers was about 2,000.

Individuals were selected using multi-stage cluster sampling method. Among all male students in district 1, two elementary schools were randomly selected and from each school five classes and from each class three students were selected. Their mothers were contacted, and if any of them was not interested in the research, a replacement was selected. In total, 30 mothers were selected. These mothers were classified in two groups (each group involved 15 people).

Intervention

In this research, a quasi-experimental

Table 1: Pretest and Posttest design with experimental and control group

	Post test	Independent variable	Pre-exam	Random selection
Examination Group	T2	X	T1	R
Control group	T2		T1	R

T2: Posttest; R: random selection; T1: Pretest; X: Independent variable

method was applied. After receiving approval from the Vice Chancellor for Research and Ethics Committee of the University, the qualified participants were first selected. Then, after explaining the objectives of the study, written informed consent was obtained from the participants. Then they were individually randomized to one of two “parallel” groups; intervention group (training in a virtual-social educational environment) and control group (without intervention). To observe ethical guidelines, the groups were allowed to leave at any stage of the study if they did not wish to continue cooperation. All 30 subjects completed the study and the follow-up assessment.

At first a pretest of knowledge about diabetes and self-efficacy was given to all mothers who were qualified for the study. We trained all mothers of the experimental group during the 10 sessions of diabetes education, and the control group did not receive any interventions. In the experimental group, the mothers received training about diabetes in twelve 60-minute sessions. In these sessions we used the multimedia training tools and software such as Snagit and PowerPoint. The posttest was administered after the experimental group acquired sufficient knowledge about diabetes. The two groups were compared at the end of the posttest, and the data from pretest and posttest were analyzed in SPSS software. To analyze the data, descriptive statistics, mean, frequency and standard deviation were used. Covariance analysis was applied for inferential statistics using SPSS software version 25.

Data Collection Tools

In order to collect research data, library studies and field method have been used. In this study, to evaluate the mothers’ awareness we used the self-efficacy questionnaire developed by Sherer et al. (5), which is valid and reliable. To examine the mothers’ knowledge about diabetes we used the Diabetes Information Questionnaire, which is available in diabetes treatment centers and general public. Standard questionnaires like

the General Health Questionnaire (GHQ) and self-efficacy questionnaire were used, and their validity and reliability are already established (6-9).

Ethical Issues

Prior to the start of the training program the researchers introduced themselves and explained the aims of the study. Written informed consent was obtained from all participants. They were also assured that all the collected information would remain confidential.

Results

The descriptive findings of this study include statistical indicators such as mean and standard deviation of self-efficacy scores and their dimensions, which are indicated in Table 2.

Inferential Findings

For statistical tests, following assumptions are considered:

- Dependent variable has interval scale
- Observations are independent
- Sampling method is random
- Variances are homogenous

It should be noted that the variables proposed in the study are spaced and their observations are completely independent. Sampling and replacement of samples were done in control and experiment groups in a completely randomized manner. In addition, in covariance analysis, synchronous variables should be specified. In this study, only the pretest effect is controlled as a synchronous variable (quartile) (11, 12).

Testing Hypotheses

The first main hypothesis: A special virtual-social learning environment focusing on the awareness of mothers of male students would affect their awareness in this respect.

As Table 3 shows, after modifying Pretest scores, there was a significant difference between the two experimental and control groups in terms of the mean of knowledge. Therefore, the first hypothesis of the research

Table 2: Pretest and Posttest statistics of awareness and self-efficacy in experimental and control groups

		Groups	Level	Average	The standard deviation	Groups	Level	Average	The standard deviation
Awareness of diabetes		The experiment	Pre-exam	40	45.1	Witness	Pre-exam	39	07.1
			Pre-exam	70	24.2		Pre-exam	42	14.1
Efficacy		The experiment	Pre-exam	80.59	77.9	Witness	Pre-exam	40.62	06.10
			Pre-exam	53.71	08.18		Pre-exam	33.61	81.10
Dimensions	Willingness to reaction behavior	The experiment	Pre-exam	56.13	84.2	Witness	Pre-exam	40.13	55.1
			Pre-exam	73.15	91.1		Pre-exam	47.14	23.2
	The desire to continue trying to complete the behavior	The experiment	Pre-exam	07.11	31.2	Witness	Pre-exam	73.10	31.2
			Pre-exam	26.12	98.1		Pre-exam	86.12	77.1
	Resist obstacles to women's behavior	The experiment	Pre-exam	08.12	54.3	Witness	Pre-exam	93.12	15.3
			Pre-exam	13.16	52.3		Pre-exam	07.14	41.3

Table 3: Covariance analysis results of Pretest and Posttest's awareness scores. Knowledge of two groups with Pretest control

Change source	Sum of squares	Degrees of freedom	Average squares	F	Significance level	Partial chute	Test power
Pre-exam	257.961	1	257.961	139.772	0.001	0.436	0.997
Groups	58.246	1	58.241	31.560	0.001	0.833	1
Error	49.831	27	1.846				
Total	7256.625	30					

is confirmed; in other words, the special virtual-social educational environment for raising awareness about diabetes has raised awareness in the experimental group. The effect or difference is equal to 0.833. In other words, 83.3% of the differences in the knowledge of the experimental group are related to the virtual-social educational environment for diabetes awareness. The statistical power of test 1 and the desirable level of significance ($P < 0.05$) show the high accuracy of the test and the adequacy of the sample size. Considering that the results of the test showed that the scores of

the experimental group were significantly increased in the posttest, compared with the control group, it can be claimed that in view of the constraints in experimental design, a special virtual-social learning environment for diabetes awareness improves the mothers' knowledge, and this hypothesis is confirmed.

The second main hypothesis: The special virtual-social learning environment has an impact on the self-efficacy of the male students' mothers.

Table 4 shows that there is a significant difference between the mean scores of self-efficacy of the two groups in the posttest stage

Table 4: Co-variance analysis of two groups in the posttest phase

Change source	Sum of squares	Degrees of freedom	Average squares	Coefficient f	Significance level	Eta square	Test power
Pre-exam	0.197	1	0.197	0.046	0.832	0.002	0.046
Groups	55.730	1	55.730	12.979	0.001	0.525	0.935
Errors	115.963	27	4.294				
Total	1313.000	30					

Table 5: Analysis of covariance of willingness to reaction of two groups in the posttest phase

Change source	Sum of squares	Degrees of freedom	Average squares	Coefficient f	Significance level	Eta square	Test power
Pre-exam	1835.764	1	1835.764	187.923	0.000	0.79	1
Post test	523.948	1	523.948	29.198	0.001	0.52	0.999
Errors	484.503	27	17.945				
Total	2226.87	30					

after the elimination of the Pretest (average adjusted) effect ($P < 0.01$). The training effect size was 0.552. It means that almost 55% of the changes in the experimental group in the posttest were due to interventional training. The statistical significance of the test is 0.83 and the desirable level of significance ($P < 0.01$) indicates the high accuracy of the test and the adequacy of the sample size. In the light of the fact that the scores of the experimental group in the posttest on self-efficacy were significantly increased compared to the control group, it can be claimed that in view of the constraints in experimental design, a special virtual-social learning environment for raising diabetes awareness increases student self-efficacy and this hypothesis is confirmed.

First sub hypothesis: The virtual-social-specific educational environment for awareness about diabetes affects the willingness to reaction the mothers of male students.

As shown in Table 5, after modifying the pretest scores, there was a significant difference between the two groups in the mean scores of willingness to reaction. The effect size of the training was 0.52, which means that 0.52 of the changes in the experimental group in the Posttest were due to the intervention. The statistical power of test 1 and the desirable level of significance ($P < 0.01$), the accuracy of the test and the adequacy of the sample size are shown. The effect or difference was 0.52,

which means that 0.52 of the changes in the experimental group in the Posttest were due to the intervention.

Second sub-hypothesis: A special virtual-social learning environment for diabetes awareness affects the desire to expand efforts among the mothers of male students.

Table 6 shows that there is a significant difference between the mean scores of the two groups in terms of their desire to expand their efforts in the posttest stage after eliminating the effect of the pretest (mean adjusted) ($P < 0.01$). The training effect size was 0.87. This means that 87% of the changes in the experimental group in the posttest were due to the training intervention. The statistical power of the test is 0.96 and the significant level of satisfaction ($P < 0.01$) indicates the high accuracy of the test and the adequacy of the sample size. Given that in the posttest the desire to expand the efforts in the experimental group was significantly increased compared to the control group, it can be argued that, in view of the constraints in experimental design, a special virtual-social learning environment for diabetes awareness increases the desire in mothers to expand their efforts and this hypothesis is confirmed.

Third sub-hypothesis: A special virtual-social learning environment for diabetes awareness has a significant effect on the mothers' resistance in the face of obstacles.

Table 7 shows a significant difference

Table 6: Analysis of covariance of desire to expand the efforts of the two groups in the Posttest phase

Change source	Sum of squares	Degrees of freedom	Average squares	Coefficient f	Significance level	Eta square	Test power
Pre-exam	0.649	1	0.649	1.029	0.308	0.36	0.16
Post test	6.533	1	6.533	5.867	0.004	0.87	0.96
Errors	17.618	27	0.653				
Total	170.000	30					

Table 7: Resistance covariance analysis in confronting the obstacles facing the two groups in the Posttest phase

Change source	Sum of squares	Degrees of freedom	Average squares	Coefficient f	Significance level	Eta square	Test power
Pre-exam	1.050	1	1.050	3.266	0.05	0.108	0.414
Post test	6.681	1	6.681	20.774	0.000	0.435	0.992
Errors	8.683	27	0.322				
Total	61.000	30					

between the mean scores of resistance in confronting the obstacles facing the two groups in the Posttest stage after eliminating the effect of Pretest (mean adjusted) ($P < 0.001$). The training effect size was 0.453. This means that 43.5% of the changes in the experimental group in the Posttest were due to the training intervention. The statistical power of the test is 0.99 and the desirable level of significance ($P < 0.01$) indicates the high accuracy of the test and the adequacy of the sample size; therefore, the hypothesis is confirmed.

Discussion

Today virtual learning environment is a vital approach in any scope of education through the world and unfortunately sometimes it is not very noticeable in our researches. This approach is very effective in raising awareness of people in any field. Diabetes is a very common and dangerous disease in the world especially Iran and Yazd. Strong research about the effect of virtual learning as an instrument for awareness of student's parent is completely ignored in previous researches and in this paper we designed this approach in Yazd for the first time.

In other words, in this study, a special virtual-social learning environment was designed and implemented for diabetes awareness. We have considered two main hypotheses and three sub-hypotheses.

Statistical analysis demonstrated that special virtual-social learning environment affects awareness of diabetes. In addition, special virtual-social learning environment has an impact on the self-efficacy of male student's mothers. Also all the presented sub-hypotheses regarding the willingness to reaction, the desire to expand efforts and resistance in the face of obstacles were confirmed. All these developments were made possible by the virtual social-learning environment, and the mothers' awareness of the symptoms and complications of diabetes has substantially increased. Therefore, in view of the assessments in this study an educational program in a virtual environment can effectively increase the public awareness of a widespread disease like diabetes.

Ethical Considerations

This study was approved by the Ethics Committee of the Meybod University. The following ethical issues were considered in this research:

This research was based on the data provided by library and field study.

Funding/Support

No funding was provided for this work.

Authors' Contributions

All authors have contributed substantially

to provide the research. All of them reviewed and developed the manuscript for submission and also read and approved the final version.

Conflict of interests

The author declares that they have no conflict of interests.

References

- 1 Benight, C. & Bandura, A. Social cognitive theory of posttraumatic recovery: The role of perceived self-efficacy. *Behaviour Research and Therapy*, 2004, 42(2), 1129-1148. DOI: 10.1016/j.brat.2003.08.008
- 2 Bandura, A. Self efficacy: Toward a unifying theory of behavior change. *Psychological review*, 2001, 48(2), 191- 215. doi.org/10.1016/0146-6402(78)90002-4
- 3 Roohi G, Asayesh H, Bathai S, Shouri Bidgoli A, Badeleh M, Rahmani H. The relationship between selfefficacy and academic motivation among students of medical sciences. *The Journal of Medical Education and Development*. 2013; 8(1):45-51. [Persian) URL: <http://jmed.ssu.ac.ir/article-1-100-en.html>
- 4 Harbison, EJ., & Rex LA. School cultures as contexts for informal teacher learning. *Teaching and Teacher Education* 2010; 26: 267-277. DOI:10.1016/j.tate.2009.03.012
- 5 Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. The Self-Efficacy Scale: Construction and validation. *Psychological Reports* 1982:51, 663-671. DOI .org/10.2466/pr0.1982.51.2.663
- 6 Montazeri, A. Harirchi, A.M. Shariati M. Gholamreza Garmaroudi, G. Ebadi M. and Abolfazl Fateh, A. The 12-item General Health Questionnaire (GHQ-12): translation and validation study of the Iranian version, *Health Qual Life Outcomes*. 2003; 1: 66. doi: 10.1186/1477-7525-1-66
- 7 Korja R, Jorma P, Riia O, Chloe LS, Sari AB, Niina J, Minna A, & Hannele .. Parents' psychological well-being and parental self-efficacy in relation to the family triadic interaction. *infant Mental Health Journal*, 2015, 36, 3, 298–307. DOI:10.1108/00220410310506295
- 8 Ragonesi, L. & Taddei, MT. (1998). The impact of diabetes mellitus on quality of life in elderly patients. *Diabetes Care Journal*. 11(3): 417-422. doi.org/10.1016/S0167-4943(98)80060-5
- 9 Castro E, Ponciano C, Meneghetti B. Quality of life, self- efficacy and psychological wellbeing in Brazilian adults with cancer: a longitudinal study. *Psychology* 2012; 3: 304- 309. DOI: 10.4236/psych.2012.34043
- 10 Schwarzer, R. & Hallum, S. (2008). Perceived teacher self-efficacy as a predictor of job stress and burnout: Mediation analyses. *Applied Psychology: An International Review (Special Issue: Health and Well-Being)*, 57, 152–171 . DOI: 10.1111/j.1464-0597.2008.00359.x
- 11 Hassanali G. ,Mohammad Khan Kermanshahi, S., Anvar Kakil3 D., and Mordoch E. The Effect of Partnership Care Plan on Metabolic Control of Iraqi Diabetic Adolescents. *Journal of Diabetes & Metabolism* 2016; 7(5): DOI; 10.4172/2155-6156.1000670.