



EFFECTIVENESS OF ONLINE DIABETES EDUCATION THROUGH WEB BASED INSTRUCTION

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Abstract:

Education involves the teaching-learning process wherein the paradigm shift has been from teaching to learning. This study provides a model for online Diabetes Education. It evaluates the effectiveness of online education through web based instruction. This study is conducted in order to create awareness about diabetes. The assessment is based on the pre-test, post-test and criterion referenced test. This single group experimental method is conducted for 30 respondents through online. Data collected were analysed using Descriptive and Inferential analysis. Results revealed that there is significant difference in the scores of pre-test and post-test. It is proved that the six modules prepared for creating diabetes education is very effective. This study concluded that the use of these modules increases the awareness and reduces the risk of diabetes.

Keywords: web based instruction, online diabetes education, pathophysiology of diabetes, educational modules

Introduction

Educational Technology is intended to make both learning and teaching processes effective as well as efficient. In view of the unprecedented explosion of knowledge in various disciplines and fields of education it is found necessary to make teaching as well as learning less time consuming and less laborious. It is also felt imperative on the part of educators to make the teaching-learning process motivating, interesting and

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exciting. Diabetes is a disease in which the body is unable to properly use and store glucose (a form of sugar). Glucose backs up in the bloodstream, causing one's blood glucose (sometimes referred to as blood sugar) to rise too high. Diabetes is a complex disease that requires daily self-management - making healthy food choices, staying physically active, monitoring the blood sugar and taking medications as prescribed. Successful self-management will help the people to feel better and can reduce the chance of developing complications including heart disease, dental disease, eye disorders, kidney disease, nerve damage and lower leg amputation.

Diabetes Mellitus

Diabetes mellitus, or simply diabetes, is a chronic disease that occurs when the pancreas is no longer able to make insulin, or when the body cannot make good use of the insulin it produces. Insulin is a hormone made by the pancreas, that acts like a key to let glucose from the food the people eat pass from the blood stream into the cells in the body to produce energy. All carbohydrate foods are broken down into glucose in the blood. Insulin helps glucose get into the cells. The position of not being able to produce insulin or use it effectively leads to raised glucose levels in the blood (known as hyperglycaemia). Over the long-term high glucose levels are associated with damage to the body and failure of various organs and tissues.

Types of Diabetes

There are two major types of diabetes. They are

- Type I Diabetes
- Type II Diabetes

In Type I (formerly called juvenile-onset or insulin-dependent) diabetes, the body completely stops producing any insulin, a hormone that enables the body to use glucose found in foods for energy. People with Type I diabetes must take daily insulin injections to survive. This form of diabetes usually develops in children or young adults, but can occur at any age. Type 2 (formerly called adult-onset or non insulin-dependent) diabetes results when the body doesn't produce enough insulin and/or is unable to use insulin properly (insulin resistance). This form of diabetes usually occurs in people who are over 40, overweight, and have a family history of diabetes, although today it is increasingly occurring in younger people, particularly adolescents.

Risk of Diabetes Mellitus

Diabetes can occur in anyone. However, people who have close relatives with the disease are somewhat more likely to develop it. Other risk factors include obesity, high cholesterol, high blood pressure, and physical inactivity. The risk of developing diabetes also increases as people grow older. People who are over 40 and overweight are more likely to develop diabetes, although the incidence of type 2 diabetes in adolescents is growing. Diabetes is more common among Native Americans, African Americans, Hispanic Americans and Asian Americans/Pacific Islanders. Also, people who develop diabetes while pregnant (a condition called gestational diabetes) are more likely to develop full-blown diabetes later in life.

Significance of Diabetes Education

There are certain things that everyone who has diabetes, whether type 1 or type 2, needs to do to be healthy. They need to have a meal (eating) plan. They need to pay attention to how much physical activity they engage in, because physical activity can help the body to use insulin better so it can convert glucose into energy for cells. Everyone with type 1 diabetes, and some people with type 2 diabetes, also needs to take insulin injections. Some people with type 2 diabetes take pills called "*oral agents*" which help their bodies produce more insulin and/or use the insulin it is producing, better. Some people with type 2 diabetes can manage their disease without medication by appropriate meal planning and adequate physical activity.

Review of Literature

Marko Radovan and Mojca Perdih (2016) developed the guidelines for evaluating the adaptation of accessible web-based learning materials information and communications technology (ICT), which is e-learning's main component, enables alternative means of accessing the web-based learning materials that comprise the content of e-learning. However, these materials can help provide a good educational experience only if they are designed carefully, which is especially true for people that have difficulties with learning from text or those with other learning disabilities (e.g., dyslexia). The main obstacle to learning for such people is usually posed by the form in which web-based learning materials are provided.

Mutahir Oluwafemi Abanikannda (2016) examined the enhancing effective chemistry learning through hypermedia instructional mode of delivery. This study provides a framework for the production of Hypermedia Instructional package. It also

assessed the effectiveness of hypermedia instructional mode of delivery on students' performance in Chemistry. This is with a view of improving the learning of Chemistry which may eventually help to improve students' performance. The developmental study employed a pre-test, post-test control group design. The study concluded that the use of HIP was an intervention which improved students' performance retention and attitude towards Chemistry.

Mehmet Fatih Baris (2015) conducted a study on the European teachers' technological pedagogical content knowledge (TPCK) and educational use of web technologies. The Technological Pedagogical Content Knowledge and Educational Use of Web Technologies (TPCK-W) were analysed in addition to the self-efficacy and attitudes of 33 teachers from eight different branches carrying out their duties in 19 countries of the European Union (EU). In this study, the Technological Pedagogical Content Knowledge-Web (TPCK-W) Survey developed by Lee, Tsai, and Chan was used. Moreover, participants' general web attitudes changed positively, depending on their web communication, web content, and pedagogical use of the web.

[Henderson J.A.](#), et al., (2012) in their article describe a randomized controlled trial, the Lakota Oyate Wicozani Pi Kte (LOWPK) trial, which was designed to determine whether a Web-based diabetes and nutritional intervention can improve risk factors related to cardiovascular disease (CVD) among a group of remote reservation-dwelling adult American Indian men and women with type 2 diabetes who are at high risk for CVD.

[Ferguson](#), et al., (2012), in their article examined designed, implemented and evaluated a 48-hour training program for community health workers (CHWs) deployed to diabetes care teams in community health centers (CHCs). The curriculum included core knowledge/skills with diabetes content to assist CHWs in developing patient self-management goals.

Taghdisi et al., (2012) recapitulates the problems caused by diabetes have direct and indirect impacts on the quality of life of diabetic patients. This study was conducted to assess the effect of the educational programme based on the precede model in promoting quality of life of patients with type 2 diabetes.

Need For the Study

Everyone who has diabetes should be seen at least once in every six months by a diabetes specialist (an endocrinologist or a diabetologist). He or she should also be seen periodically by other members of a diabetes treatment team, including a diabetes nurse educator, and a dietician who will help develop a meal plan for the individual. Ideally, one should also see an exercise physiologist for help in developing a physical activity

plan, and, perhaps, a social worker, psychologist or other mental health professional for help with the stresses and challenges of living with a chronic disease. Everyone who has diabetes should have regular eye exams (once a year) by an eye doctor expert in diabetes eye care to make sure that any eye problems associated with diabetes are caught early and treated before they become serious. Also, people with diabetes need to learn how to monitor their blood glucose. Daily testing will help determine how well their meal plan, activity plan, and medication are working to keep blood glucose levels in a normal range. Hence, the researcher has constructed six modules in Diabetes Education viz., Pathophysiology, Complications, Prevention, Nutrition, Exercise and Monitoring.

Objectives of the Study

1. To design and host a website for Diabetes Education which allows users to access the information according to their unique need and interest.
2. To find out the effectiveness of the Web-Based Instruction in the context of Online Diabetes Education with respect to different modules.
3. To find out whether there is any significant difference in the effectiveness of the Web-Based Instructional Modules in Diabetes Education with respect to different demographical variables.

Hypotheses of the Study

1. There is significant difference in the effectiveness of the Web-Based Instruction in the context of Online Diabetes Education with respect to different modules.
2. There is significant difference in the effectiveness of the Web-Based Instructional Modules in Diabetes Education with respect to different demographical variables of the online learner's viz. Gender, age and location of the learners.

Methodology

The researcher has selected Single Group Experimental Study Method for this study. A website has been created in the address www.diabeteseducation.co.in for this study. The website has content on six headings viz., Pathophysiology, Complications, Prevention, Nutrition, Exercise and Monitoring. Each module has its own objectives, text, and summary, FAQ, glossary, links, reference and download. Modules consist of multimedia packages which include video, audio, graphics, animations, text and images.

Tools Used

The researcher has constructed a tool suitable to find out the effectiveness of the website. 100 questions which consists 25 questions in Pathophysiology and 15 each in other five modules were prepared to evaluate knowledge, understanding and application of the respondents. This modules consists pre-tests and post-tests. The criterion referenced test was prepared for immediate feedback.

Since the data collection is the online process, 30 respondents were selected for this study. The age of respondents ranges from 21 to 48. Out of 30 respondents, 22 were Indians, 7 from Tanzania and 1 from Uganda.

Analysis and Interpretations

Hypothesis 1

There is significant difference in the effectiveness of the Web-Based Instruction in the context of Online Diabetes Education with respect to different modules.

Table 1: Significance of Difference between the Mean Scores in
Pre Test & Post Test of the Samples

Modules	Test	Mean	SD	N	't' value	Significance
Pathophysiology	Pre test	6.97	4.71	30	2.194	Significant
	Post test	21.77	3.91	30		
Complications	Pre test	3.93	2.53	30	5.371	Significant
	Post test	12.67	2.71	30		
Prevention	Pre test	3.27	2.90	30	4.277	Significant
	Post test	13.27	2.29	30		
Nutrition	Pre test	3.73	3.23	30	6.937	Significant
	Post test	14.10	1.03	30		
Exercise	Pre test	4.37	3.22	30	3.080	Significant
	Post test	13.73	2.12	30		
Monitoring	Pre test	3.63	3.12	30	2.630	Significant
	Post test	13.63	1.56	30		

Table 1.1: Mean, Standard Deviation and Differences in Overall Scores of Respondents

Test	N	Mean	SD	't' Value	Remark
Pre-test	30	25.9	17.43	8.108	Significant
Post-test	30	89.16	11.26		

The above table reveals that the calculated t value exceeds the table value (1.96) in all the six modules. It is concluded that there is a significant difference in the effectiveness of the Web-Based Instruction in the context of Online Diabetes Education with respect to different modules.

Hypothesis 2

There is significant difference in the effectiveness of the Web-Based Instructional Modules in Diabetes Education with respect to different demographical variables of the online learner's viz. Gender, age and location of the learners.

Table 2: Significance of Difference between the Mean Scores in
Post Test of the Samples

External Independent Variables		N	Mean	SD	t value	Remarks
Gender	Male	17	86.294	14.114	0.0797	Not Significant
	Female	13	92.923	3.774		
Age	Up to 30 years	16	91.937	8.744	0.1669	Not Significant
	Above 30 years	14	86	13.220		
Country	Indian	22	91.409	5.828	0.2578	Not Significant
	Abroad	8	83	19.101		

The above table reveals that the calculated value is not exceeding the table value (1.96) at 5 per cent level of significance in all the three demographical variables. However, by analysing the mean, the researcher says that the female respondents scored better than the male and the respondents belong to the age group of up to 30 years scored high when compared with the people above 30 years. The post test scores of Indians are slightly high when compared the respondents from abroad.

The module wise analysis of the post test scores with respect to different demographic variables are given below.

Table 3: Significance of Difference between the Mean Scores in
Post Test of the Samples with Respect To Gender

Modules	Gender	N	Mean	SD	't' value	Remarks
Pathophysiology	Male	17	21.05	4.879	0.22021	Not Significant
	Female	13	22.69	1.887		
Complications	Male	17	11.82	3.004	0.03740	Not Significant
	Female	13	13.76	1.832		
Prevention	Male	17	12.82	2.833	0.19028	Not Significant
	Female	13	13.84	1.143		
Nutrition	Male	17	14.11	1.166	0.91324	Not Significant
	Female	13	14.07	0.862		
Exercise	Male	17	13.23	2.562	0.11168	Not Significant
	Female	13	14.38	1.120		
Monitoring	Male	17	13.23	1.786	0.09160	Not Significant
	Female	13	14.15	1.068		

Table 4: Significance of Difference between the Mean Scores In
Post Test of the Samples with Respect to Age

Modules	Age	N	Mean	Sd	't' value	Remarks
Pathophysiology	Up to 30 years	16	22.81	3.10	0.130	Not Significant
	Above 30 years	14	20.57	4.48		
Complications	Up to 30 years	16	13.75	1.84	0.022	Not Significant
	Above 30 years	14	11.42	3.05		
Prevention	Up to 30 years	16	13.68	1.57	0.022	Not Significant
	Above 30 years	14	11.42	3.05		
Nutrition	Up to 30 years	16	14	1.21	0.568	Not Significant
	Above 30 years	14	14.21	0.80		
Exercise	Up to 30 years	16	13.93	1.87	0.588	Not Significant
	Above 30 years	14	13.5	2.40		
Monitoring	Up to 30 years	16	13.75	1.39	0.675	Not Significant
	Above 30 years	14	13.5	1.78		

Table 5: Significance of Difference between the Mean Scores in
Post Test of the Samples With Respect to Location

Modules	Location	N	Mean	SD	't' value	Remarks
Pathophysiology	Indian	22	22.545	2.344	0.237	Not Significant
	Abroad	8	19.625	6.300		
Complications	Indian	22	12.954	2.419	1.281	Not Significant
	Abroad	8	11.875	3.440		
Prevention	Indian	22	13.772	1.020	0.218	Not Significant
	Abroad	8	11.875	3.943		
Nutrition	Indian	22	14.136	0.940	0.792	Not Significant
	Abroad	8	14	1.309		
Exercise	Indian	22	14	1.603	0.416	Not Significant
	Abroad	8	13	3.162		
Monitoring	Indian	22	14	1.154	0.119	Not Significant
	Abroad	8	12.625	2.133		

Recommendations

1. The learner should be actively engaged and made to feel the real-life experiences through simulation.
2. Keeping in mind the various learning styles of students, a variety of media are made use of to develop appropriate learning environment to achieve the desired learning out-comes.
3. Learning experiences must reflect the needs and interests of the community. Provisions should be made for the visitors of the web-site to react and exchange ideas with it.
4. Incorporating new knowledge and viewpoints empower learners and encourage critical thinking. Knowledge becomes functional when the individual creates meaning from his experiences instead of simply accepting what others say as true. True knowledge results from critical analysis of what one happens to learn.
5. All people with diabetes and those at risk of diabetes, no matter where they live, have the right to learn about diabetes, how it can be prevented, how it can be managed effectively and how to access educational and clinical resources.
6. Diabetes self-management education that integrates the clinical, behavioural and psychosocial aspects of diabetes self-management should be available and sustained.

Conclusion

Web-based instruction offers learners unparalleled access to instructional resources, far surpassing the reach of the traditional classroom. It also makes possible learning experiences that are open, flexible, and distributed, providing opportunities for engaging, interactive, and efficient instruction. Furthermore, cognitive-based theories of learning have extended the design and delivery of Web-based instruction, applying the technical nomenclature to instructional practices.

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