Potentials of Web 2.0 for Diabetes Education of Adolescent Patients

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Abstract. Diabetes is a very common chronic disease which produces complications in almost all body organs and consumes a huge amount of the health budget. Although education has proved to be useful in diabetes management, there is a great need to improve the availability of these courses for the increasing number of diabetic patients. E-learning can facilitate this service, but the current education system should be tailored towards e-learning standards. Amongst diabetic patients, adolescents as computer natives are suggested as the best target to e-learning diabetes education. With regards to its features, Web 2.0 can be a very good technology to build a framework for diabetes education and consequent evaluation of this education.

Diabetes Mellitus (DM) is one of the major chronic diseases characterized by high blood glucose level. Diabetes is classified by two main types based on the pathogenic process which leads to hyperglycemia. Type I is caused by complete or near total deficiency of insulin and type II is caused by heterogenous set of factors such as variable degrees of insulin resistance, impaired insulin secretion, and increased glucose production. Reports by Diabetes UK which use Yorkshire and Humber Public Health Observatory (YHPHO) model, a population-based model for both diagnosed and undiagnosed diabetes, indicated that the prevalence of diabetes has risen from 3.54% to 3.66% between 2006 and 2007, due to the 0.33% incidence rate of diabetes [1, 2] and increased efficacy of diagnostic procedures.

The Diabetes Control and Complications Trial (DCCT) provided definitive proof that reduction in chronic hyperglycemia can prevent many of the early complications of type I DM. The UKPDS research proved the similar result in type II of diabetes.

Adolescence is a critical period in diabetes which is characterised by profound alterations in the metabolism as a result of physiological adaptations during puberty. This feature of adolescence commonly manifests as a deterioration of glycemic control. Prevalence of both type I and type II diabetes has increased amongst young people of less than 18 years of age.

Due to the element of personal responsibility involved in most procedures of diabetes care, such as carbohydrate intake control, blood glucose monitoring, insulin injection in type I diabetes and also diet control and weight watch in type II, education does play an important role in this process. The educational requirement is also emphasized by National Institute for Clinical Excellence (NICE) guidance on diagnosis and management of type I diabetes in children and young people. National

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Institute for Clinical Excellence (NICE) defines structured education as "a planned and graded programme that is comprehensive in scope, flexible in content, responsive to an individual's clinical and psychological needs, and adaptable to his or her educational and cultural background." Also standard 3 of the National Service Framework (NSF) states that: "all children, young people and adults with diabetes will receive a service which encourages partnership and decision-making, supports them in managing their diabetes and helps them to adopt and maintain a healthy lifestyle".

Adolescence is a period for learning independence and increasing self-esteem. This formative period is the optimal time for educating patients to accept their own responsibility for care.

The statistics show that the coverage of education for young patients with diabetes is not satisfactory. The results of a survey conducted by Diabetes UK shows that only 5.5% of diabetic children have received structured education about their disease [3] which is less than the 11% coverage of structured diabetes education in all diabetic patients in the UK [4]. The most limiting factors were lack of courses on offer or inappropriate timing and/or location of the course.

There were several successful trials in application of Internet based education system for this purpose such as the Informatics for Diabetes Education and Telemedicine (IDEATEL)[5] project in the USA and the patient-orientated diabetic education management (POEM)[6] project in Taipei which demonstrated the benefits of this tool for diabetes education. Also Bell J A et al designed a pre-test post-test project (Brainfood) [7] and showed the effectiveness of online diabetes education. These methods can facilitate diabetes education by increasing availability of the course as 61% of UK households have access to the Internet [8].

E-learning programs can be self managed which helps learners to arrange courses based on their personal schedules. The other problem concerning current education programmes is highlighted by Ko et al.[9] in a follow-up study, who showed that the effects of these education programs are limited to under one year. Some previous scholars such as Rosenstock have suggested the requirement for reinforcement of education programs [10].

Today's adolescents are considered to be a computer-native generation. They are more familiar with computer technology compared to previous generations and have the ability to adopt this technology much more easily.

According to Technology Mediated Learning (TML) theory of Dr Alavi [11] to increase the effectiveness of an e-learning system two tasks should be performed:

1. Enriching the delivery medium
2. Increasing the time and amount of interaction with users.

Web 2.0 can be characterized as a group of economically, socially, and technological improvements in attitudes, tools, and applications that allow the web to become the next platform for communication, collaboration, community, and cumulative learning.

Generally this concept increases the level of access for users to enrich the educational content on the web and for this reason it is considered a "Read-Write" version of web versus the previous system in which users were only allowed to "Read" the content provided by webmasters and web content providers.

Web 2.0 has specific features which can provide the requirement for TML model. It benefits from the Rich Internet Application (RIA) concept which enriches the delivery medium. The "Web as a platform" concept of Web 2.0 will allow for building a framework for users to interact more with the system, upload their own data and receive personalized education based on their requirements and preferences.

Additionally this system can be used to conduct surveys about satisfaction levels of users with the system as this is considered as a major factor reflecting the perceived effectiveness of the system.

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