

Self-Regulated Learning in a Mobile Health Initiative for Diabetic Patients

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Abstract—Diabetes self-management education (DSME) is the process of facilitating the knowledge, skill, and ability necessary for diabetes self-management. It takes into account the needs, goals, and history of the person living with diabetes and is guided by evidence-based standards and an established curriculum. This paper presents the patients perceptions on a new mobile initiative intended to promote better self-care practices using self-regulated learning. Results of a focus group show there is a need for this type of learning environment in the target community and the majority of patients surveyed are willing to use the mobile phone as a delivery platform.

Keywords- *diabetes self-management education, mobile health, mobile learning, self-regulated learning, self-care*

I. INTRODUCTION

In recent times, health care systems are moving from the provider-centric to the patient-centric model. This shift, places more focus on the patients as the main drivers and managers of their self-care processes. Furthermore, with the increase in telecommunications bandwidths and reach, there has been a development thrust in the area of telemedicine and mobile health allowing health care services to take on alternative forms other than the traditional doctor office setting.

This paper presents a mobile health initiative called Mobile DSMS that provides the patient with the necessary tools to better self-regulate their health-related learning tasks. Self-regulation is a learning process where a learner can revise his goal via the monitor of the learning process [1]. The authors argue that executing self-regulation is challenging from the viewpoints that the learning materials can be limited and fractal. However, through the advent of information and communications technology, new mechanisms are now more readily available that make learning materials easier to obtain and at a faster rate. Mobile technologies, in particular, have broadened the learning environment as eLearning platforms are no longer confined to the classroom or home setting.

In the next Sections, we present the learning domain called diabetes self-management education, we explain how mobile technologies can be used to foster self-regulated learning in this area through a mobile application called Mobile DSMS and we provide some preliminary results obtained from a focus group used to evaluate the system's concept and design.

II. DIABETES SELF-MANAGEMENT EDUCATION

Diabetes self-management education (DSME) is the process of facilitating the knowledge, skill, and ability necessary for diabetes self-management. The overall objective of DSME is to support informed decision-making, self-care behaviors, problem-solving and active collaboration with the health care team. Studies have shown that DSME in diabetes care have improved clinical outcomes, patient health status, and quality of life for the diabetic [2].

There are many challenges faced with the current approaches to DSME especially in the developing regions [3]. Two of the shortcomings are the limited availability and accessibility of DSME. In some regions there are not enough diabetes educators to meet the needs of the increasing numbers of people living with the disease and many people find it difficult to incorporate DSME into their daily routine. This is where self-regulated learning using the mobile platform can make an impact because the learner is provided with an open learning environment to navigate and access the necessary resources on demand. Many of the existing mobile self-regulation tools enable the patient to use a cell phone as an electronic diary and they usually afford some form of remote coaching service provided by a health care provider [3, 4, 5]. This research differs in that it employs structured learning syllabi along with peer support to facilitate self-regulation. In the next section we describe the Mobile DSMS system and explain how the design facilitates self-regulated learning in diabetes self care.

III. MOBILE DSMS

Mobile DSMS is a mobile application that allows patients to record, review and share in matters relating to the self-management process. One feature of the application is a learning platform built on the Diabetes Self-Management Education Standards [6]. The diabetic patient uses the Mobile DSMS application to set personal health goals (after consultation with a health care provider), record and monitor their behaviours relating to self-management and share with their peers experiences from living with the disease. Figure 1 illustrates how the system features are designed based on the Self-Regulation Process Model [7].

The mobile application acts as a digital diary and the patient is able to record observations of daily living including blood pressure (BP) reading, blood sugar (BS) reading, exercise activities, daily meals and current location. The system also captures the related health goals, for

example, desired BP and BS readings. When the user reviews their history of recordings using the application, the values are displayed in relation to these set goals. Therefore the patient can visualize her progress in meeting these goals.

The mobile platform facilitates the search for information relating to DSME through a forum-like feature called *Discussions*, structured around the different components of the DSME curriculum as shown in Figure 2. Depending on the patient's interests, she can use this knowledge base to learn more about or contribute to a particular self-management subject. Patients are also able to connect with other patients in a peer-group approach to share their experiences on living with the disease.

Through the recording, reviewing and sharing, patients can reflect on their current self-care behaviours and resulting outcomes and adjust their self-management routine to meet their new health status. Take for example this illustrative scenario: Sarah had been recording her daily routine using the mobile application for the last month. When she reviews her BP reading she notices that there is an increase relative to her desired BP range. Sarah is concerned about this increase and decides to search for information relating to lowering ones BP using the *Discussions* feature. She also decides to send a message to one of the peers in her group with a similar situation to obtain some advice. Through this search, she is able to find the necessary information to adjust her health goals and plan an appropriate corrective action such as increasing her activity level goal and adjusting her diet goal.

IV. METHODOLOGY & RESULTS

In January 2012, a focus group comprising of 21 participants was conducted to obtain preliminary impressions of the system prototype. The members of this group were randomly selected from a clinic, specializing in diabetes-related care, situated in a rural area in Trinidad and Tobago. The prototype and its features were demonstrated to the participants and each participant was asked to comment on its design, its perceived functionality and if they would use it.

All the participants found the system to be helpful. 95.24% of the participants said that they would use a system of this type and the remainder said that they were unsure. When asked if they were currently receiving any form of formal DSME, all the participants replied that they were not currently enrolled in any form of DSME programme. In terms of initial impressions of the system, the majority of

participants said there are challenges in seeking relevant information related to DSME and they believe that the system has the potential to improve the accessibility and distribution of this type of information.

V. DISCUSSION AND CONCLUSION

In this paper, we have presented a mobile health initiative which provides diabetics with a platform to foster self-regulated learning with respect to diabetes self-management education. The system combines the use of two essential self-regulation sources, namely social and self-directed experiences. The diabetic patient uses the Mobile DSMS application to set personal health goals, record and monitor their behaviours relating to self-management and share with their peers experiences from living with the disease. The results from the focus group indicate patients are interested in the system's concept and the nature of the system addresses many of the challenges faced by the traditional means of acquiring this type of education. In May/June 2012, field trials will be conducted with a group of 50 diabetic patients to measure the learning outcomes derived from Mobile DSMS compared to existing DSME initiatives and to evaluate patient satisfaction with the system.

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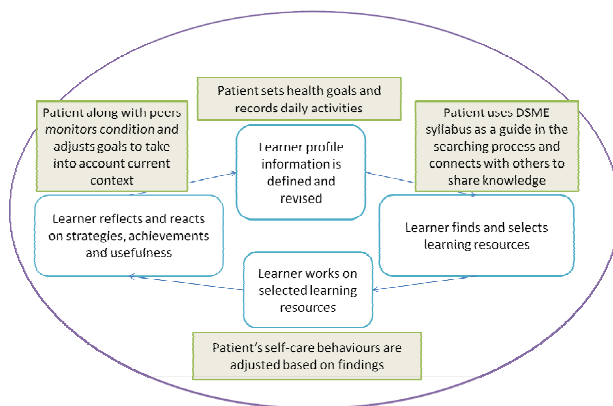


Figure 1. Adapted Self-Regulated Learning Process Model



Figure 2. Diabetes Self-Management Education Curriculum