



A New Framework for Integrating eLearning with eHealthcare in a Mobile Environment

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Abstract—Healthcare of the population is one of the leading concerns of many countries. The healthcare facilities should advance as there is an increase in the number of chronic illness cases which require high cost. This problem can be eradicated with the advancement of eHealth System which relies on information technology. Fortunately, the healthcare technology has also advanced with regard to speed, communication, size and mobility. The present day health monitoring systems have one main drawback which is that it is not ubiquitous with respect to the flexibility and privacy of the patients. However, the mobile healthcare monitoring system also known as mHealth provides a solution to the above drawback by providing the patients with a good healthcare without them visit the doctors. Also, patients can imbibe knowledge about their diseases with the help of various learning modules, which can be easily integrated with mHealth. This advancement provides benefit to doctors as well as the patients. This paper presents a framework to integrate the mHealth with eLearning and aims to improve the existing healthcare system.

Keywords—eHealth, information technology, ubiquitous, eLearning, mHealth

I. INTRODUCTION

Across the world, the face of health service delivery has been changed with the use of mobile & wireless technologies. Effective blend of different components are driving this change. These incorporate fast advances in mobile technologies & applications, new opportunities for the incorporation of mobile health into existing eHealth administrations, and the proceeded development in the scope of mobile cell systems. The incomparable spread of mobile technologies and advancement in their imaginative application to address mobile needs has developed another field of eHealth, known as mHealth. These mobile networks offer high speed for the transmission data and thus they transform the way in which the health services and information's are accessed, managed and delivered. A component of eHealth is mHealth. The Global Observatory for eHealth (GOe) defined mHealth or mobile health as medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.

It has likewise been demonstrated that rising healing facility costs are the primary reason for increasing expenses in patient social insurance. Numerous patients with non-life-threatening diseases requiring health observation don't essentially oblige hospitalizations; they just require observing by means of a mobile framework that incorporates shrewd capacities to recognize variations from the norm give advice and send cautions to medical staff in the occasion of a serious issue. In the case of illness such as diabetes, in remote area, a diabetic specialist will not be available. This problem can find solution with the help of the mHealth, as these rural patients can consult the specialists in cities to improve the health service.

This paper discusses on how the eHealth frameworks can be used for advancing the mobile based healthcare monitoring system. The first section presents a survey on eHealth and it also defines the objective of mHealth, the barriers faced and the different categories of mHealth taken into consideration for performing the survey. The second section considers a framework which integrates the eHealth and eLearning and proposes an application of the framework considered in the mobile environment

II. LITERATURE SURVEY

Following papers were extensively researched for understanding the integration of mHealth with eLearning:

[1] *Intelligent Mobile Health Monitoring System (IMHMS)*, Rifat Shahriyar, Md. Faizul Bari, Gourab Kundu, Sheikh Iqbal Ahamed, and Md. Mostofa Akbar

The paper focuses on utilization of mobile computing technologies for interaction among patients, doctors, and other medicinal services laborers. As cell phones have turned into an indispensable part of each individual's life, it can incorporate medicinal services all the more consistently to our ordinary life. It empowers the conveyance of precise medicinal data whatever time, any place by method for cell phones using. Intelligent Mobile Health Monitoring System (IMHMS)

[2] *Using Smart Phones and Body Sensors to Deliver Pervasive Mobile Personal Healthcare*, Patrick Crilly1, Vallipuram Muthukkumarasamy

Pervasive health awareness is viewed as an important aspect in lessening use and empowering enhancements in sickness administration. Advances in remote correspondence and sensor advancements allow the constant procurement, transmission and transforming of basic restorative data. In this paper, there are changed methodologies of gushing physiological information from body sensors over a remote system.

[3] *A Smart Approach Towards a Mobile E-Health Monitoring System Architecture*, Ahmed Alahmadi, Ben Soh

A framework has been proposed that analyzes patient's data and decisions are made at each level to take into account the patient's health condition, necessary advices, recommendations, etc. It also allows the patients to carry out their daily chores without being troubled by their health conditions.

[4] *Pervasive Healthcare and Wireless Health Monitoring*, Upkar Varshney

The paper is mainly based on techniques to understand how pervasive health care can be embedded in smart emergency management, appointment reminders, and also wireless sensor based monitoring.

[5] *Mobile Patient Monitoring: the MobiHealth System* K. Wac, R. Bults, B. van Beijnum, I. Widya, V. Jones, D. Konstantas, M. Vollenbroek-Hutten, H. Hermens

The MobiHealth framework gives profoundly adjustable essential signs tele-checking and tele treatment framework in light of a body area network (BAN) and a versatile health awareness (mHealth) administration stage using cutting edge open remote systems.

III. EXISTING SYSTEM

The second worldwide study on eHealth was led in late 2009 and was intended to expand upon the learning base created by the first study directed in 2005. While the first study was general and principally asked advanced level of questions at the national level, the 2009 review displayed more intricate inquiries in a progression of overview modules, including mHealth. The objectives of the mHealth module were to report mHealth movement in Member States and in addition distinguish: the obstructions to its appropriation. This included, particularly, recognizing and reporting:

- The presence and development of mHealth exercises inside Member States;
- Sorts of mHealth activities being led;
- Assessing mHealth activities; and
- Obstructions to its execution

Huge numbers of the main six barriers to mHealth usage identified with the requirement for further learning and data, for example, evaluating viability and expense adequacy of mHealth applications. Other key hindrances included clashing health framework needs, minimal supporting strategy, and lawful issues. Information security and subject protection are regions that oblige lawful and arrangement thoughtfulness regarding the guarantee that mHealth users' data are properly protected.

The overview found that most Member States use mHealth activities: 83% of the 112 participating Member States reported the vicinity of no less than one mHealth activity in nation. Of these, three quarters reported four or more sorts of mHealth activities. Just 19 reacting nations did not report the vicinity of a mHealth activity. It is critical to note that a Member State reporting zero mHealth activities does not demonstrate that no mHealth activities are being led in the nation. Nearby tasks being executed by little associations or nongovernmental associations (NGOs) may not be broadly known and the master sources finishing the survey might not have been mindful of them. Furthermore, the review was constrained by the way that respondents could just give one illustration to every mHealth classification. Therefore, the quantity of activities reported shows the broadness of mHealth movement in a nation.

A. mHealth Categories

Following mHealth categories were considered in conducting the survey:

1. Correspondence in the middle of people and wellbeing administrations
 - Emergency toll free nos.
 - Health call centres
2. Correspondence between health administrations and people
 - Reminders regarding appointments
 - Awareness raising over disease issues
3. Conference between medicinal services experts
 - Portable telemedicine
4. Intersectoral correspondence in crisis
 - Emergencies

5. Wellbeing checking and surveillance
 - Quiet monitoring
 - Mobile studies
6. Access to data for social insurance experts at purpose of centre
 - Information and decision supportive networks
 - Patient records

IV. PROPOSED SYSTEM

In today's world the people are becoming more and more aware and conscious of their surroundings and health. And as the information and communication technology is developing so fast most of the work in present time is done on computers and mobiles. In this scenario, eHealth is a major aspect as, with its help all the data collection, storage, restore, analysis, and management regarding the medicine can be done easily using the technologies reducing the manual work. It also helps improving the communication between the doctors and the patients as they are able to interact and ask queries in a more comfortable way without travelling long distances.

Another useful aspect of the information and communication technology is eLearning. With the use of eLearning, a person is able to access modern and comprehensive learning material, study in groups, and is able to study with active participation instead of just looking at the one way material presentation. All this helps in gaining better knowledge and interest towards learning. If these two aspects of the technology are merged together it will become very easy to increase the awareness among the patients and others regarding various diseases and epidemics. With this the patient will be able to gain knowledge about any particular topic regarding diseases, their prevention methods, their treatments, medicines etc. and become more aware of the topic. This might help in the crucial situations where an instant first-aid or help is required.

In this paper, we consider an eHealth and eLearning integration framework which helps in the proper functioning of the hospital, as well as enhancing the awareness among the patients and improving communication between the doctors and the patients. We have proposed the application of this framework in the mobile environment. Today, almost everyone owns a Smartphone, so the implementation of the framework as a mobile application will make it easier to be accessed by everyone. It will help the users in easily accessing their medical history, and diagnostic test results as they can download the reports directly to their phones. They will be able to interact with the doctors face to face with the help of the video chat facility using the front cameras of their phones. They will be able to check their appointments easily on the app without calling the hospital again and again or sitting in front of a PC or laptop. They won't need to carry their prescription everywhere with them as they will be able to view it on the phone. Not only that, they will also be able to search about various medical details like information about a disease or medicine, for their own knowledge and will be able to rely on the information obtained as it will be uploaded by the experts themselves. They will also be able to gain information and clear their doubts by direct interaction to the doctors and the experts and then can do all this while on the move.

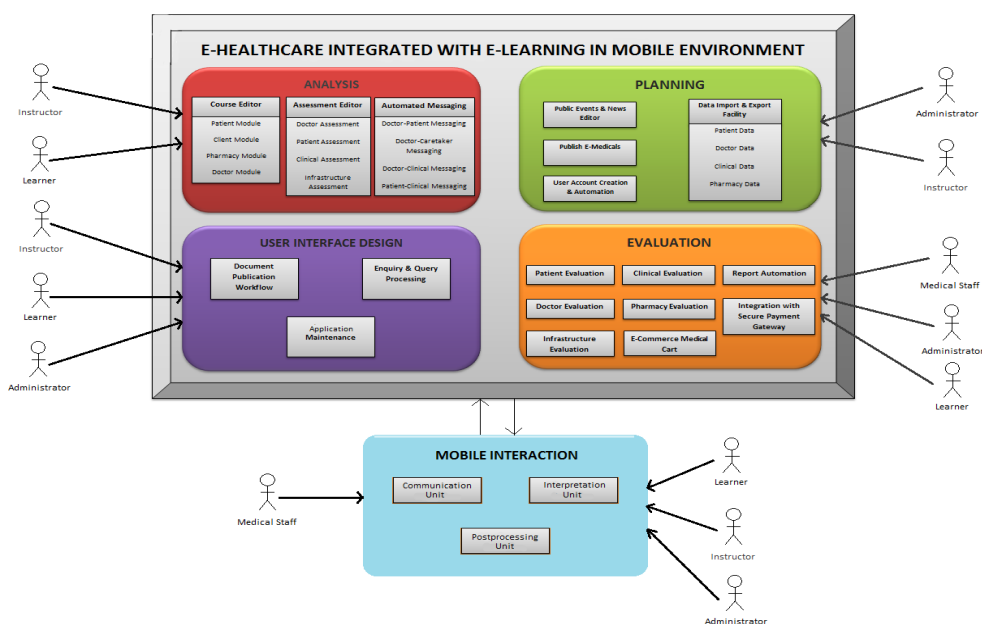


Fig: E-Healthcare integrated with E-Learning in Mobile Environment

The framework describes about the methods and structure through which the integration of e-learning and e-healthcare can be implemented in the mobile environment. The proposed framework mainly consists of five phases:

1. Analysis
2. Planning
3. User Interface Design

- 4. Evaluation
- 5. Mobile Interaction

1. Analysis:

In analysis phase the information gathered by the application is studied and processed to get better outputs from the system. There are three modules namely:

- Course Editor
- Assessment Editor
- Automated Messaging

In Course Editor Module there are four submodules in which is mainly explained that how the details about various data accessed by the personals is analyzed. Like the information about the data which is frequently accessed by the patients to increase his awareness regarding a topic or the user details or the information about the medicines in the pharmacy etc. In Assessment Editor Module there are four sub-modules in which the personal details about various aspects are assessed. Like the information and history of experience of the doctor of the patients diagnostic history or the hospitals infrastructure details. In Automated Messaging module there are again four modules that control the messaging system between the doctors, caretakers, patients and diagnostic center.

2. Planning:

In planning phase the information of various events and data transfer is maintained. There are four modules namely:

- Public events and News Editor
- Public E-Medicals
- User Account creation and Automation
- Data Import and Export Facility

In Public events and News Editor module, the display of information regarding various events conducted by the hospital is maintained. In Public E-Medicals module the history of the test results and the diagnostic reports is maintained. In User Account creation and Automation the details entered while registration and their automatic availability is controlled. In Data Import and Export Facility there are four sub-modules that control the transfer of various data between different hospitals

3. User Interface Design:

In User Interface Design phase the frequently used forms are maintained. There are three modules namely:

- Document Publication Workflow
- Enquiry and Query Processing
- Application Maintenance

In Document Publication Workflow module the process of publishing various documents and reports online is maintained. Under Enquiry and Query Processing module the patients can discuss and clear his doubts with the doctor through the mobile application. In Application Maintenance module the functioning of the mobile application is maintained by the administrator. In any error is there in the application it is immediately rectified.

4. Evaluation:

In Evaluation phase the performance of the hospital and its staff and the patient's recovery is evaluated. There are eight sub-modules which define the method by which the status of the patient, performance of the doctor, staff and clinic and the billing system can be monitored.

5. Mobile Interaction:

In mobile interaction phase the core working of the framework on the mobile interface is controlled. It works on the smooth running of the integrated mobile application on the mobile network. It includes following modules

a. Communication Unit: The Communication Unit of mobile environment has multiple functions. One of its functions is to maintain the messaging and communication between the doctor and his patient or the patient's caretaker or between doctor or patient and the diagnostic center. The other function of the communication unit is to regularly upload the vital details in the database of the system for the patient already admitted in the hospital.

b. Interpretation Unit :The work of the Interpretation Unit is to read the data stored in the system and process it to get the conclusion on the status of the patient in a mobile environment compatible format.

c. Post-processing Unit: The Post-processing Unit displays all the results formulated by the interpretation unit in the mobile application. It also provide feedbacks and notifications for further action to be taken regarding the patient. It synchronizes with the interpretation unit and controls the display function.

V. CONCLUSION AND FUTURE WORK

To give portability in an individual health framework for checking crucial signs, mobile is a helpful and suitable gadget to go about as the control hub. Also, mobiles have turned into the gadget pervasive for individual correspondence

and information access. It is rich in usefulness and can be used to give extra detected information, either from the learning modules, or from the framework that provides a suitable way to interact with the doctors on the other hand from client information. Besides, correspondence will just improve the suitability of the utilization of mobile in the pervasive health framework.

In future we can further work on making an even better framework and its implementation to make it use easier for the users so that it attracts more clients for the system and help in speeding better awareness among the people about their health and the resources available near them regarding it.

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