SHAWCO K2 Centre Project: Mobile Learning Literature Synthesis Paper

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ABSTRACT

The usage of mobile phones and web learning environment are important in teaching and learning. This improves the learning process of the students in and out of their classrooms. In addition, technology plays an important role in our communities, business and education because of the high demand of research, training and teaching. Therefore, with time and needs, universities and businesses need to exploit the current technologies to solve and improve the current problems without the development affecting any entity. This paper looks into the current applications that develop similar teaching and learning problems using mobile phones and web based systems by critically analyzing and comparing their technologies, difference and similarities and what makes our solution better. The final examination analyzes the cost and usage of MXIT and concludes that mobile phones integration with web based learning environments using MXIT to exchange messages is the best solution.

Categories and Subject Descriptors

D.3.3 [**Mobile Learning Technologies**]: Data exchange and Features –*SMS*

General Terms

Design, Reliability, Human Factors, Verification

Keywords

SMS, mobile learning, mobile phones, teaching, learning

1. INTRODUCTION AND MOTIVATION

Mobile phones provide us with new capabilities and choices for action to bridge the digital divide and allow better ways to solve the teaching and learning problems especially for those people with no access to computers. They provide good ways to exchange messages, which could be useful when students have problems or questions to make; messages are used give students instructions using the Web environment; and the portability of mobile devices gives the students the opportunity to use the device anywhere at any time [1]. It has been shown that mobile phones are becoming the best and efficient technology for grade K-12 students in education because of their portability compared to using the school computer laboratories [2] and that the youth are competent with SMS to exchanges messages [3]. This implies that this technology is applicable for youth in addressing the learning and teaching problems as it allows student to learn in both social and the classroom environment. Furthermore, this makes a good impact on the learning process of the students because of the enjoyment, independence of students and the ease of using mobile phones to send text messages.

In South Africa there is a need for projects that bridge the digital divide, due to the fact that majority of the citizens in this country do not have access to computers. The SHAWCO K2 Centre is a non profit student run organisation situated at Khayelitsha, a township in Cape Town, teaching grade 10 – grade 12 learners from the surrounding area basic computer skills. The organisation gets help from the student body at the University of Cape Town (UCT) by acquiring volunteers at the beginning of each year. The problems currently faced by students and the organisation are that there is no functioning network, medium to communicate and notify students and facility to ask questions after hours.

The main aim of the project is to develop an Online Learning Environment (OLE) that will provide tutors with a facility to notify students of upcoming events by sending text messages to student's mobile phones. This will provide students with a forum to ask tutors questions by sending text messages using mobile phones to a central web server and provide a backend to store frequently asked questions. We have taken this approach since today there is an increase demand for technology and

methodology concentrating on training, especially on distant training [4].

The aim of the project is going to be achieved by looking into current projects that developed similar applications and solving similar problems as to answer the following questions. What the better technologies to use are? What are the similarities and differences between the current solutions and our new proposed solution? What will differentiate and make our solution better compared to the current solutions? This will support why certain technologies are used and why certain decisions were made in solving the problems.

The rest of the paper is organized as follows. In Section 2 we look at the similar applications to find relevant problems that were being solved and the technologies used. In Section 3 we critically analyze and compare the technologies that were used, similarities and differences of current applications to eliminate some of the technologies and give factors and reasons as to make rational decisions in solving and achieving the aim of this project. In Section 4 we give an overall evaluation and conclusion by looking at the major advantages and factors to make final decisions to solve the problems efficiently and meet the specified requirements.

2. RELATED WORK

A number of applications have been developed which use Mobile phones and web based learning environments to solve the learning and teaching problems. In particular the applications exchange text messages in order to communicate, share information and ask questions from their tutors, friends and classmates. This section will present evidence of similar applications solving similar problems as follows:

2.1 Dynamic Frequently Asked Questions (DFAQ)

The Dynamic Frequently Asked Questions (DFAQ) is an application that solves the learning and teaching challenges using cell phones and web interface which makes it similar to our project. The aim of DFAQ is similar to the aim of the proposed system because DFAQ exploits the competence of SMS texting among University of Cape Town students to address the educational challenges and address the impact that the SMS and Web Interfaces creates to the students [5]. The main educational challenges that were addressed by the DFAQ system are the

preparedness of the students, background diversity and large size classes. Large size classes and the preparedness of students mean that some of the students do not have opportunity to ask questions in their classrooms. This implies that students will ask questions using the DFAQ web and mobile phones system after hours. This is the main problem of SHAWCO K2 Centre that the project is going to focus on.

Figure 1: DFAQ Web Interface

The DFAQ system creates two processes when the question is posted. In the first process, the questions are sent to the public queue where anyone can respond. In the second process the email notification is sent to the lecturer about the questions. The SMS is delivered to the lecturer if the questions sent by the students were not delivered within thirty minutes. It also implements the mechanism to trace how the users use the response delivered to them. DFAQ has two versions which are not integrated, the cell phone messaging application and web application. The web application uses emails to send responses to the user

2.2 ALYKKO Tutoring Application

ALYKKO is a tutoring application like Moodle that provides both the web learning interface and the mobile learning interface using SMS messaging and Multimedia messages to notify students with events and allows students to ask questions after classes, which is similar to the main aim of our project [1]. It consists of portfolios and documented tutoring dialogues that are shared between students, tutors and teachers which allows students to communicate and share information. It also uses tutoring agents to answer student's questions automatically to reduce the waiting time for the question to be answered. This differs with our application because our application needs tutors to answer the questions manually. This application extends the leaning and tutoring to take place in and out of the classrooms like DFAQ. The applications can be used with GPRS and Web based environment to transmit messages.
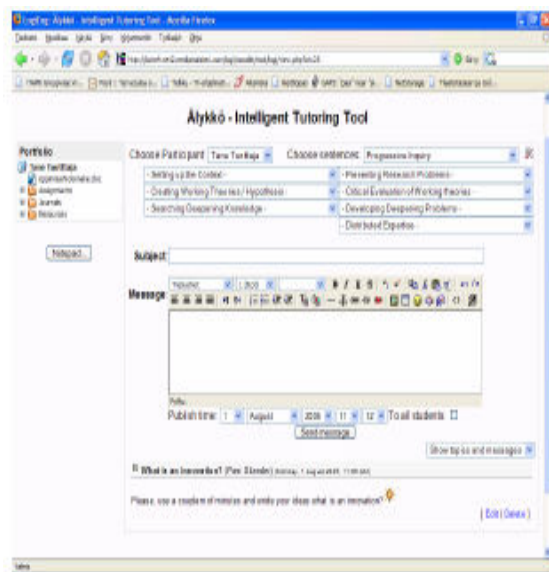

Figure 2: ALYKKO Web Tutoring Interface

2.3 MOOP Tutoring and Teaching Application

MOOP is an interactive mobile learning environment where students use mobile phones to collect and record information about their surroundings; manage and analyze information about the surroundings and communicate within groups [3]. It allows students to send queries to other members that can collect information and record the findings on the learning environment. MOOP is also one of the applications similar to DFAQ and

ALYKKO to solve the teaching and learning communicational problems using SMS messaging to help students after their classrooms .The aim of MOOP is to create a learning model to support learning and teaching using mobiles phones. This will increase the interaction and collaboration between students and teachers which gives students the opportunity to learn and access information from anywhere at anytime using their mobile phones.

The application is designed for mobiles phone capable of running Symbian (S60) operating system for cell phones. It also uses General Packet Radio Service (GPRS/3G) to connect the cell phones and transmit digital data to appropriate servers and mobiles phones which is similar to MXIT mobile phone application. The application allows students to access the same information using the web based learning environment called Riihi.

2.4 Intelligent Agent for adapting and Delivering Electronic Course Materials to Mobile Learners (IAADE)

A mobile phone communication system for solving learning and teaching education challenges was suggested by Mohamed Ally at.al [14]. The aim is to develop an intelligent agent capable of adapting to the heterogeneous of mobile computing environments, since mobile phones operate differently and have different capabilities. The system uses the user preference sent by the user based on the cell phone hardware and software capabilities to make decisions on which tools to use to format the course materials before delivery.

The user sends the request to the server using mobile phones. This includes the course materials and the mobile phone software and hardware capabilities, thus increase the sever performance in a case where the server cannot automatically match the capabilities of the client's mobile phone with the capabilities stored in the database using the mobile name. The web application server receives the information and sends back the reply back to the user's mobile phone. It use the Resource Description Framework (RFD) represented Composite/Preference Profile (CC/PP) to describe the cell phones capabilities and user format preferences and Resource Description Query language(RDQL) to get device information.

2.5 MXIT and Jabber technologies

There are number of reasons why this technology is used as media to exchange messages between the student's mobile phone and the web application providing the communication service between tutors and students. We need a good understanding of what MXIT is before looking into factors of why it going to be used. MXIT is mobile phone chat application that allows one to exchange messages between a computer and a mobile phone and between MXIT mobile phones [8]. It works together with Jabber which is an open source instant messaging protocol for exchanging information [7]. Jabber is the internet standard protocol for Instant Messaging and Presence communication. Its base technologies are Extensible Messaging and Presence Protocol (XMPP) which is set of streaming XML protocols and technologies that enable any two communicating parties on the internet to exchange messages, presence and structured information in real time [9]. Why are MXIT and Jabber technologies going to be used in project?
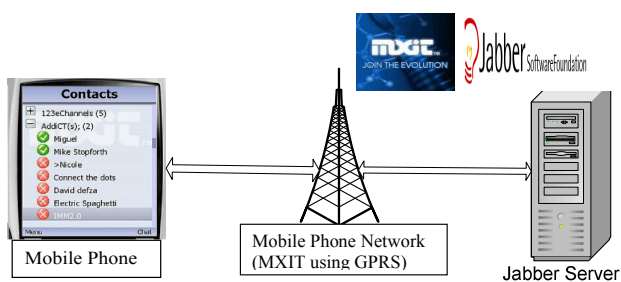
Figure 3: How MXIT and Jabber work together

3. DISCUSSION AND ANALYSIS

This section is going to compare and analyze the applications that were presented above by looking at the technologies that were used and what can differentiate our proposed solution with the current solutions to the teaching and learning problems. It is from a good understanding and analysis of these factors and their situations, what each technology had to offer and a good understanding of the problems that one could derive a sustainable solution appropriate for the people and the problem to be solved and make good decisions of how to solve the problems.

3.1 Why MXIT Mobile Phones Application?

It was mentioned earlier on that SHAWCO K2 Centre is a non profit organisation that is currently faced with the problems of notifying students and facility to ask questions after the tutoring sessions or after their classrooms. It is reasonable and advantageous to exploit the usage and cost of MXIT. It is widely used by many teenagers, cheaper than SMS (maximum cost of sending a message is 2 cents) and free to download with no monthly cost. There are currently 2 million users where the majority of users are between 12 and 17 [6]. Similarly, one of the UCT PhD students Jakkaphan Tangkuampien, is currently involved in a project with high school students. The project involves the usage of Jabber and MXIT mobile phone application with the majority of students having access to mobile phone. This will contribute is testing our application and answering the research questions after implementation. The maximum length of messages is 2048 while SMS is 160 characters. MXIT provides us with very good benefit. However, only MXIT users with mobile phones capable of running MXIT can communicate and receive messages from their tutors.

The disadvantage of MXIT can be reduced to provide the communication service to a larger population by the usage of the internet for people without Java enable mobile phones. Internet users can use Instant Messaging (IM) applications such as GTalk, MSN, AIM, ICQ and Yahoo with no trace that a mobile phone or the IM application was used because both users can access the same service. Furthermore MXIT handles the problem of converting information to a mobile phone appropriate format which reduces the work of converting data to all different kinds of mobile phones. Unfortunately, IM applications are costly when used with internet enabled mobile phone to exchange messages between the communicating parties with a higher cost than that of MXIT. The number of MXIT users increased from 360 038 users to 2.3 million from January 2006 to 20th November 2007 where Gauteng makes up 28.58% of MXIT users, followed by Western Cape with 26.78% and KwaZulu_Natal at 22.14 % [10]. This shows that MXIT has a great potential in providing the efficient and cheap communication service, thus helping to solve the teaching and learning problems.

3.2 Why Jabber?

Jabber is network architecture and platform independent as it follows the architecture of many Instant Messaging applications and it makes the integration between application and products easier, thus provides IM applications to use it. It provides features such as notification, addressing, data exchange, negotiation, information metadata and support multi-third party data exchange

to application that are built on top of it. In addition, It also allows conservation between people, applications and both people and application together [11].

3.2 Critical comparisons of current mobile phone applications

The applications mentioned above shows an insight of how the communication problem of providing tutors with a facility to notify students of upcoming events by sending text messages to student's mobile phones is solved. Basically, these applications are solving very similar problems using the same mechanism which is to provide students with SMS text messaging media to communicate and ask questions anywhere at anytime using their mobile phones when they are at home after their classrooms or tutoring sessions. Similarly, the usage of the Web and the Mobile phone is common in these applications. Looking deeply into the current applications, one can realize that theses applications are solving similar problems using different ways and answering different research questions. MOOP uses mobile phones to collect record and manage information while ALYKKO provides a tutoring agent to automatically answer the student's questions and automatically guide the students with their dynamic learning models. It differs with our application because it uses S60 operating system while our application uses mobiles phones capable of running MXIT. The key feature is that no matter what these applications are solving, at the end they exchanging text messages between tutors and students using mobile phones and the web interface which is the aim and focus of the SHAWCO K2 Centre project.

Mobile learning is a growing field that is encouraging in the choices it provides to solve the communication problems in education. There are very encouraging lessons that the current mobile applications showed. They showed that it is advantageous and reasonable to exploit the usage of mobile text message exchanging to communicate. In addition, they showed that mobile phones are becoming the best and efficient technology for communication between students; students love and use mobiles phones with excellence because of the portability of using mobile phone in authentic environment and enjoyment of using the mobile phone [3]. Similarly, most of the people own mobile phones than desktop computers in that mobile phones are cheap since the price is subsidized by the network usage payment and people knows how to use mobile phones better compared to

desktop computers. This will allow greater penetration to affectively solve the communication problems.

It is clear and understandable what and how the current applications are solving the communication problems; and mobile learning provided us with new knowledge and information, the information can be used to proceed to explain how the SHAWCO K2 Centre is going to be done. Our system will integrate both the web and cell phone application that is most similar to DFAQ replacing the email usage mechanism of sending responses to students with the mobile phones texting message exchange using MXIT to minimize the cost of using SMS and integrating both interfaces. The system will provide different features to support the aim of the project and the research questions that need to be answered. Some of the technologies to be used are PHP and MySQL that are similar to the technologies used by ALYKKO. MXIT is also going to be used as media to exchange text messages between tutors and student using Jabber based on the Smack API. It is important to realize that MXIT also uses GPRS like the current applications.

A study has also been conducted with the SHAWCO K2 Center management and tutors. The results show that SHAWCO uses the Community Bulk SMS application [12] to notify the volunteers of any tutoring event with a cost of approximately R5000, 00 per month (23 cents per message). This is disadvantageous because of the costs of sending SMS; and it provides one way communication between the management and volunteers excluding the participants. This means that SHAWCO will have to pay extra money to send SMS messages to a large number of students. The alternative cheaper solution that we are proposing suggests the usage of MXIT mobile application. MXIT will allow two way communications between the management, volunteers and participants, thus tutors and management will send messages for free while students will pay 2 cents to send a message.

Table 3: MXIT and BULK SMS costs comparison

MXIT		BULK SMS
MSG Direction	Rand/MSG	Rand/MSG
Tutors-> Students	0	0.23
Students->Tutors	0.2	Not Possible

4. SUMMARY AND CONCLUSION

It was mentioned that the main aim of the project was to develop a web based Learning Environment (OLE) that provides tutors with facility to notify students of upcoming events by sending text messages to student's mobile phone. This paper looks into the current applications that develop similar teaching and learning problems using mobile phones and web based systems by critically analyzing and comparing their technologies, difference and similarities and what makes our solution better. We started by giving at related applications such as DFAQ,MOOP, ALYKKO and an Intelligent Agent for Tutoring and Teaching as to bridge the digital divide to developing countries with no access to computers or internet.

Furthermore, MXIT and Jabber were explained, analyzed and compared to the usage and cost of SMS in solving the non profit organization SHAWCO K2 Centre communication problems between tutors and students. This was useful in forming a foundation and understating of what needs to be critically analyzed in order to come to a rational decision of which technologies and issues that have to be considered. The Related applications and technologies were compared and analyzed, more importantly the costs and java mobile phones issues of using MXIT and the advantages and disadvantages. It is from the factors and effects of those technologies that we conclude that the mobile phones integrated with the web based environment using MXIT to exchange messages is he best solution to solve the current problem. MXIT and Jabber meet the problem and project requirements and provide a cheap and easy to use application than the current used community Bulk SMS application.

5. ACKNOWLEDGMENTS

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