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Effectiveness of Mobile Educational Using a QR Based U-Learning Materials for Personalized Tutoring

M Sakthivel, S Anitha, R Rajalakshmi

Asst. Professor, Vel Tech High Tech Engineering College, Chennai, India

Department of MCA, Vel Tech High Tech Engineering College, Chennai, India

ABSTRACT--This learning built-up a QR-based U-Learning Material Production System (QR-ULMPS) that has lecturers with associate education tool to encourage level students listed in a very arts course. QR-ULMPS was specifically designed to support the event of u-learning materials and make an enticing context-aware u-learning setting analysis style for college students. A quasi experimental was accustomed appraise the effectiveness of QR-ULMPS; the Unified Theory of Acceptance and Use of Technology (UTAUT) assessed the feasibility of exploitation QR-ULMPS to implement teaching activities; whereas the educational Materials Motivation Survey (IMMS) was accustomed live the students' learning motivation when exploitation the projected u-learning system. From the results of the UTAUT form, we have a tendency to found that lecturers rated the system positively and were willing to just accept and adopt QR-ULMPS into their course content. Lecturers conjointly in agreement that QR-ULMPS was a useful gizmo to encourage students' learning throughout outside teaching activities. Moreover, results of the IMMS form indicated that students allotted to the projected u-learning system achieved higher results than participants learning via typical strategies. We have a tendency to believe that the projected u-learning system is advantageous as a result of it enhances student motivation and permits for higher levels of engagement, significantly throughout outside learning activities. Thus, we have a tendency to conclude that the projected u-learning system will produce a learning expertise that each interests and engages students. Though QR-ULMPS isn't mature enough to be used across a sundry of instructional domains, it provides associate innovative chance for lecturers to integrate a unique teaching methodology that challenges ancient instructional norms. **Keywords:** Quick Response (QR) Codes, Ubiquitous Learning, tutoring system, Context awareness.

I. INTRODUCTION

In trendy societies, the pervasive nature of hand-held mobile devices like pill computers, personal digital assistants (PDAs) or smart phones will extend the educational setting way beyond schoolroom walls [1]. Such speedy development of technology has forced digital learning to adopt a mobile learning (m-learning) platform. This mobile learning model provided a new delivery mechanism to beat time and house limitations of ancient schoolroom learning [2], [5]. Recently, the concept of context-aware omnipresent learning (u-learning) was identified as a unique learning setting, associate setting through that students may be schooled acceptable content at the right time and within the right place. This novel learning environment will sight discourse info within the world and adapt consequently to supply tailor-made learning content through mobile devices in response to completely different learning contexts or things. In gift day lecture rooms, academics usually introduce abstract theories like cultural variations, to students within the following ways: filmstrips throughout category time, ancient outside teaching strategies, or through field visits to assist students perceive differences between native and aboriginal cultures [4]. As such, field of study courses targeted round the exploration of cultural heritage or aboriginal cultures should oft incorporate field visits or outside experiences, that are thought to be the most applicable teaching models. However, typical outside teaching approaches could also be long and rather labor-intensive for each teacher and learner. Typical teaching models might solely give unidirectional data transmission in the planet, and is therefore less effective because it lacks meaningful interaction with students

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throughout the data transfer part [1]. Additionally, students typically don't learn sufficient data while not teacher steering, and that they are easily distracted throughout outside teaching activities. For these reasons, the applying of context-aware u-learning technologies to support authentic learning activities has become a preferred research topic in recent years [7]. Over the past decade, the continual development of the radio-frequency identification (RFID) technique has spurred the advancement of context-aware u-learning environments. With the help of the RFID technique, u-learning systems will discover and record students' learning behaviors within the planet, and enables students to find out content found within the planet "actual space" instead of in Net [8]. However, several academics do not have spare programming data and that they lack coding skills to develop and execute the RFID technique [9]. It is not uncommon for educators to face variety of problems once working with RFID systems, notably once handling the complexities of RFID tag production. This can be as a result of RFID tags can not be written victimization ancient printers, however rather needs either industrial grade or specially designed printers. This downside complicates the assembly method and hinders the probability of incorporating RFIDs into regular course content, especially once the RFID technique is employed in a very mobile context [10], [10]. For all the explanations listed on top of, it's clear that academics face many barriers once building their own context-aware u learning environments during which students will act with and learn from real-world issues. Virvou and Alepis argued that the development of academic programs is AN arduous task that demands abundant effort from domain and pc specialists [9]. Tsou and his colleagues conjointly indicated that academics face difficulties in group action relevant educational content into digital learning platforms. It's been well documented that most lecturers don't possess necessary programming knowledge, they lack the aptitude to form RFID tags and square measure usually unable to properly execute RFID techniques. If lecturers want to customize a context-aware u-learning setting, they need help from specialists. To overcome the aforesaid barriers, our study planned the use of fast Response (QR) codes in conjunction with a context-aware u-learning system that permits lecturers to create customizable context-aware u-learning materials while not expert help. The mixing of QR codes will connect users to info quickly and simply, whereas the low technical barrier of making u-learning academic materials along with straightforward accessibility to code readers permits lecturers to build fashionable learning environments while not trouble. As QR code-decrypting code is much on the market on most mobile devices, QR codes became more and more fashionable and widely utilized in mobile learning applications. For this study, we felt that the appliance of QR code technology would be suitable within the context-aware u-learning setting. Our study endeavored to form a QR-based U-Learning Material Production System (QR-ULMPS) that consists of 3 sub-systems: a QR-based transmission materials redaction system; a transmission material sharing server; and a context-aware u learning system. Through the redaction system and also the sharing server, lecturers have the flexibility to provide distinctive teaching content, share u-learning materials, and have interaction students in authentic learning activities. The u-learning system permits students to gain substantial learning information through observation and follow in out of doors settings. To check the real-life relevance of our system, twelve lecturers and 48 students were recruited to participate in our experiment, and they were asked to demonstrate whether or not QR-ULMPS might improve the out of doors teaching and learning method. The goal of this study wasn't solely to support lecturers in building context aware u-learning environments, however conjointly to support students in enhancing their learning motivation and interest in authentic educational activities.

II. RELATED WORKS

In recent years, researchers have investigated various ways of incorporating tiny computer sensors into context-aware u learning applications. Examples of these tiny sensors may include RFIDs, contactless smart cards, barcode tags or sensor network nodes. Sensors can be used in the u learning environment to provide both active and adaptive support to students, promoting curiosity and encouraging initiative in the classroom. Among tiny computer sensors, QR code technology is a very suitable pairing tool for u-learning applications for three main reasons. First, QR codes can scan and encode large amounts of data, including, but not limited to URLs, text, and numerical characters. Second, the low technical barrier of creating and reading QR codes allows educators to include teaching content in the context of u-learning [1]. Third, most mobile devices are equipped with QR code readers. Therefore, QR code technology can be feasibly accessed via mobile devices in different context-aware u-learning environments. The potential use of QR code technologies in an educational context has been investigated quite recently. Law and So presented a comprehensive review on the use of QR codes in education. The researchers introduced a number of examples that covered a wide

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variety of educational applications, integrating QR codes and mobile devices into subjects ranging from life science to math, English listening exercises, and even accessing library catalogs. Along the same lines, Hwang and colleagues developed a web 2.0-based u-learning system that combined mobile phones with QR code and web 2.0 technologies. This system allowed students to generate QR codes and download related learning materials directly onto their mobile devices. The students could also collaboratively build a database of learning materials to share their individual knowledge and personal learning materials with peers. Alternatively, Chen and Choi proposed a learning project that integrated an online mapping service with a comprehensive content management system. This system allowed for the connection of physical locations or objects, such as books and digital artifacts and documents, through QR codes. All of these studies reveal the vast potential of applying QR code technologies in support of educational applications as an innovative teaching tool. For this current study, the application of QR code technology not only supported students

	NO. OF USERS	NO. OF COMPUTERS
E-LEARNING	1	1
U-LEARNING	1	N

in accessing online information materials via mobile devices, but also fulfilled all of the context-aware u-learning environment needs of teachers using the system. QR-ULMPS enables teachers to create u-learning materials and related QR codes directly through the simple user interface, and this proposed system provides personalized learning opportunities which offers students a more authentic and memorable learning experience.

III.SYSTEM ARCHITECTURE

This study describes QR-ULMPS, a planned system that serves to enhance the creation of u-learning materials, enhance learning throughout out of doors activities, and additional develop context aware u-learning environments. The principal goal of the study was to supply an alternate methodology for teaching idea related to cultural heritage in an out of doors surroundings. As movability and quality are necessary factors for associate degree authentic out of doors learning expertise, our QR-ULMPS required to include touch screen mobile devices [17]. For this study, we have a tendency to utilized smart phones to access data contained within the QR ULMPS, and equipped every smart phone with wireless communication abilities to attain each movability and quality. These smart phones were preloaded with package supported the mechanical man2.3 platform. The QR-ULMPS was designed victimization Java programming language that can be dead on Java Machine (JVM) no matter the present mainframe design. Of extra applications for enterprise, amusemfunctions.

As shown in Fig. 1, QR-ULMPS is formed of 3 subsystems:

- (i) the QR-based multimedia system materials writing system, (ii) the multimedia system material sharing server

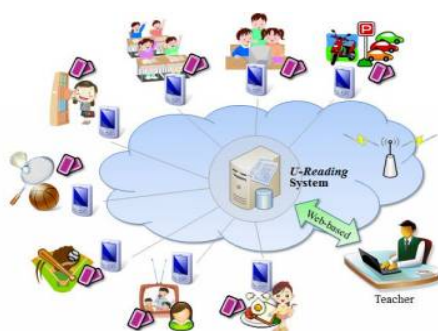


Figure1. System architecture of U-Learning system

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IV. TECHNIQUES

This study was conducted in conjunction with “Introduction to Taiwanese Cultural Heritage”, a subject course tutored at the Aletheia University in Taiwan. This course was created to provide historical monuments placed within the north of Taiwan to school level students. 2 segments of the course were dedicated to describing the spectacular lifespan achievements of Dr. Reverend George Leslie Mackay. throughout the active learning part of the course, the teacher created arrangements for all students to go to Oxford school, the Taiwan-ese establishment supported by Dr. Mackay. vital artifacts like personal journals and private mementos were rigorously pre-served at the school to commemorate the reverend’s heritage. To avoid potential negative impacts and minimize any disturbance to the course, the educational content was designed by a tutor United Nations agency was directly chargeable for administering the course. This teacher ready all out doors teaching activities and materials with none input from the researchers of this study. The teacher additionally ensured that every one students may access an equivalent course content and each the management and experimental teams used identical learning environments for the period of this study. the training goals of the course were as follows: 1) to know Dr. Mackay’s academic background and lifelong experience; 2) to know the aid services provided by Dr. Mackay in Taiwan; 3) to know the preaching of Dr. Mackay in Taiwan; 4) to know the history of creating the Protestant denomination in Taiwan; and 5) to know the history of creating Oxford school in Taiwan. The goal of this course was to boost the students’ data of Dr. Mac-kay and his contributions.

U-Learning System	E-Learning System
The system can sense the learner’s environment. It is context aware.	The system cannot sense the learner’s environment. It is not context -aware
Learners can never lose their work. There is continuity	Learners can lose their work. There is no continuity.
Learners have access to their information from anywhere	Learners have access to their information in specific locations.
Learners get information immediately	Learners cannot get information immediately
Learners interact with experts and others.	Learners interaction is limited
Learners gets the right information at the right time	Learners get the available information

V. RESULTS

Results of student survey

Forty-eight freshman school students participated during this re-search study. The experimental results showed that the planned context-aware u-learning system may have a substantial impact on student’s motivation and learning

1. Research Objective 1

The minimum and most uncountable the IMMS were thirty six and one hundred eighty, severally, because the response scale ranges from one to five. The response scores collected from the experimental cluster ranged from a minimum of one hundred twenty five to a most of a hundred and sixty, whereas the response scores from the management cluster ranged from a minimum of 112 to a most of 137. These results indicated that each teaching models will moderately encourage students and pique their learning interest.

2. Research Objective 2

The descriptive statistics for the four factors of the ARCS model. For all factors, the mean scores corresponding to the responses provided by the experimental cluster were beyond those from the management cluster. The mean score of all responses from the experimental cluster were higher than three.6, whereas the eye, Confidence and Satisfaction factors

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of the management cluster were below three.6. The best distinction among the mean scores was derived from the Satisfaction issue ($M_2 = \text{three}.94$, $M_1 = 3.53$, $M_2 - M_1 = 0.41$). all-time low overall distinction was produced from the eye issue ($M_2 = \text{three}.67$, $M_1 = 3.56$, $M_2 - M_1 = 0.11$). The Shapiro-Wilk take a look at was performed to judge the distribution of the four factors for any variations between the 2 teaching models. we have a tendency to finished that the distinction between the eye issue ($W = \text{zero}.934$, $p\text{-value} = \text{zero}.077$), the connation issue ($W = \text{zero}.968$, $p\text{-value} = \text{zero}.517$) and also the Satisfaction issue ($W = \text{zero}.930$, $p\text{-value} = \text{zero}.062$) could come back from a traditional distribution, whereas the distinction within the Confidence issue ($W = \text{zero}.917$, $p\text{-value} = \text{zero}.029$) could come back from a non-normal distribution.

3. Research Objective 3

As found in analysis objective one, students were extremely motivated after they used our u-learning system. Indeed, knowledge collected from the IMMS discovered that the experimental cluster appointed a mean score of 137.13 to the context-aware u-learning system, in a very scale go between a hundred twenty five and one hundred sixty. Table five displays descriptive statistics for the four factors that delineate students' motivation as participants within the experimental cluster. The very best mean scores were achieved from the connation issue ($M = \text{three}.96$) and therefore the Satisfaction issue ($M = \text{three}.94$). rock bottom mean score was appointed to the eye issue ($M = \text{three}.67$). Table vi lists the twelve queries that the experimental cluster tried and true, that served to live the eye issue of the ARCS model. the very best mean score corresponds to Question eight ($M = \text{four}.07$), that indicated that the projected u-learning system was attention-grabbing for participants. Quite eightieth of the scholars specifically reportable that the projected u-learning system helped to keep up their attention throughout the educational activity. twenty out of twenty five students within the experimental cluster disagreed with the statement that mistreatment our u-learning system to find out content was irritating (Question thirty one, $M = 4.00$). Moreover, eighteen out twenty five of the respondents indicated that there was one thing attention-grabbing at the start of the u-learning system that instantly caught their attention (Question two, $M = 3.93$).

4. Research Objective 4

For this analysis objective in our study, we have a tendency to ascertain participants World Health Organization were at random allotted into the experimental cluster. Our objective was to see whether or not the projected u-learning system might be appropriate for branch of knowledge courses in a very tier setting. We have a tendency to interviewed the experimental cluster mistreatment the u-learning system concerning their expertise when the completion of the training activity. The comments were all associated with the projected u-learning system, through that re-searchers collected info from participants relating to overall satisfaction and "learn ability" from mistreatment the system

VII. DISCUSSIONS

This study projected that QR-ULMPS may encourage lecturers curious about building a context-aware u-learning atmosphere for his or her students to use QR codes that supports the delivery in fact content via mobile devices. we tend to wished to check if the pro-posed u-learning system may function AN tutorial tool for motivating and interesting students in humanistic discipline courses, especially those conducted in an out of doors setting. The results were obtained by grouping and analyzing knowledge from numerous sources, as well as form evaluations, midterm examination scores, direct observations and private interviews. the subsequent sections discuss the findings we tend to uncovered during this study.

VII. CONCLUSIONS AND FUTURE WORK:

This study proposes the employment of a tool referred to as the QR-based U-Learning Material Production System (QR-ULMPS) that actually helps academics build a context-aware u-learning atmosphere. During this new and technologically increased learning atmosphere, students will move with real-world issues, and additional mix real-world resources with a wealth of digital world data to seek out information applicable to their desires. Therefore, QR-

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ULMPS was designed to resolve problems encountered once exploitation standard outside teaching approaches, that square measure usually terribly long and effortful. With a high level of technical support designed into the QR-ULMPS, academics will simply incorporate outside teaching activities into their domain information, with demonstrable edges in student learning and motivation. In relation with the practicableness survey, the instructors participating during this study were ready to study and use the QR-ULMPS to make a context-aware u-learning atmosphere. The measurement proven that academics were happy with the projected QR-ULMPS. It's evident that academics were conjointly seemingly willing to continue exploitation this technology and expressed interest in desegregation the u-learning system into their alternative course curricula. These quantitative results reiterated the results obtained from the chemical analysis that advocated the feasibility of instructor's exploitation QR-ULMPS. Therefore, though the QR-ULMPS isn't nonetheless mature enough to be utilized in a sundry of academic applications and domains, it will give associate degree opportunity for academics to conduct categories that differs from, and quite probably improves on, ancient teaching ways. In relevancy the advantages survey, the scholars collaborating within the experimental cluster indicated that they felt happy with the projected u-learning system and achieved high levels of concentration whereas playacting the mandatory learning tasks. The measurement proven that students were moderately intended by the employment of our context-aware u-learning system. These quantitative results were complimented with the qualitative analysis and therefore the test scores that provided proof of the advantages of exploitation this technique in supporting the educational method. we tend to believe that the projected u-learning system not solely ends up in positive effects on students' motivation, however our system may promote higher learning outcomes. Further studies ought to be conducted to validate this deduction. Although this study provides persuasive results, it's advisable to conduct a similar analysis study that spans across an ex-tended amount of your time to avoid the novelty result, within which user performance generally improves once new technologies square measure introduced. It might be helpful to work out what result this system will wear student learning throughout a long study within which the projected u-learning system will probably end in bigger edges. Moreover, although our context-aware u-learning system looks to be innovative and fascinating, a collaborative learning atmosphere wasn't enforced for this study. it's expected that students World Health Organization have the choice to participate in cooperative learning through active discussions, information sharing and drawback finding square measure a lot of seemingly to enjoy the educational method and solidify their information acquisition. Thus, in our follow up study, we tend to propose that a cooperative atmosphere ought to be created accessible wherever student's square measure inspired to provide content, share u-learning materials, and learn collaboratively throughout outside activities. moreover, the parameters of this study solely allowed for the accomplishment of forty eight student participants and that we couldn't collect formal pre/post-test information to gauge every individual's learning background and performance. Such limitations may end up in inexact experimental outcomes. Thus, the researchers aim to revise the experimental style to beat these limitations, with efforts centered on recruiting participants and applying a proper analysis method to produce a lot of correct experimental outcomes. Finally, we tend to attempt to implement standardized moral consent policies all told of our follow up experiments be-cause we tend to believe that moral approval should be obtained from legal establishments, and this action will guarantee our analysis process and study procedure is conducted with integrity and fairness towards all participants. Based on the results of this study, we tend to believe our work will encourage academics to develop a context-aware u-learning environment, that supports students in getting adequate information throughout outside teaching activities. we tend to shall give participating self-learning opportunities for college students to review teaching content and brush au courant connected materials in a very means that's appropriate to their distinctive individual desires.

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