ENHANCING EDUCATION THROUGH MOBILE AUGMENTED REALITY

By

D.R. ROBERT JOAN

Assistant Professor, Christian College of Education, Marthandam, Tamil Nadu.

ABSTRACT

In this article, the author has discussed about the Mobile Augmented Reality and enhancing education through it. The aim of the present study was to give some general information about mobile augmented reality which helps to boost education. Purpose of the current study reveals the mobile networks which are used in the institution campus as well as university. Also, this study discusses the way to develop education and exchange information through mobile network. This article talk about, how one can improve the learning through mobile functions. Mobile Augmented Reality makes it possible to create new kind of services and applications. By making augmented reality work in mobile environments, people face new challenges in positioning, registration, system performance and energy consumption. The evolution of cellular networks and related technologies has recently been very fast. The transfer rates and low latencies for packet data required by many Augmented Reality applications are feasible using the upcoming generation cellular networks. The transmitting of information through mobile network takes a vital role in education. The classes which broadcast were listened through the mobile network by learner. Thus mobile augmented reality is captivating its role to enhance Education.

Keywords: Mobile Augmented Reality, Education, Learning in Augmented Reality.

INTRODUCTION

Mobile multimedia has become an integral part of our lives. A vast variety of multimedia services are email, messaging, networks, mobile payment, mobile video conferencing, video and audio streaming, etc. Within the last few years, mobile multimedia has become the accepted standard, driven by developments in end-user devices, radio networks, and back end services. The evolution of cellular networks and related technologies has recently been very fast. The transfer rates and low latencies for packet data required by many augmented reality applications are feasible using the upcoming generation cellular networks. Together with evolving transfer speeds, miniaturized displays and accurate positioning enable the building of a commercial mobile terminal with sufficient capabilities for mobile augmented reality in education.

Augmented Reality

Augmented reality is a direct or indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory inputs such as sound, video, or graphics. It is related to a more general concept called mediated reality, in which a view of reality is modified by a computer. As a result, the technology functions by enhancing one's current perception of reality (Graham, Zook, and Boulton, 2012). By contrast, virtual reality replaces the real world with a simulated one. Augmentation is conventionally in real-time and in semantic context with environmental elements, such as sports scores on TV during a match. With the help of advanced augmented reality technology, the information about the surrounding real world of the user becomes interactive and digitally worked.

Mobile Augmented Reality

Mobile Augmented Reality makes it possible to create new kind of services and applications. Some example applications of mobile augmented reality includes, personal navigation, guidance systems, tele-operation, security, entertainment, e-commerce and personal services. Generally, augmented reality is defined as to mean any case where computer generated objects, text,

pictures and sound are added to the user's perception of the real world. By making augmented reality work in mobile environments, people face new challenges in positioning, registration, system performance and energy consumption. Some experimental mobile augmented reality systems have been built, but most current systems work only in a restricted area and do not have sufficient means for communication. They usually use commercially available or self-built wearable computers as their platform and their application area is often limited to some specific tasks.

Mobile augmented reality has long sounded like a wild futuristic concept, but the technology has actually been around for years. It becomes more robust and seamless with each passing decade, providing an astonishing means of superimposing computer-generated images a top user's view of reality, in order to create a composite view rooted in both real and virtual worlds. Although augmented reality applications run the gamut from interactive map overlays and virtual showrooms to massive multiplayer king of the hill titles and the like, each piece of software hones in on smart-phone and camera functionality to create a more immersive experience (Widder, 2014). So it should be very effective for education.

Mobile augmented reality provides learning designers and educators with a new opportunity to start thinking more deeply about the mobile learner's context and situation. Augmented reality technologies can take any situation, location, environment, or experience to a whole new level of meaning and understanding. Augmented reality is uniquely changing the way people learn with mobile devices (Jason Haag, 2013).

Aim of the study

The aim of the present study was to give some general information about mobile augmented reality which helps to boost the education.

Purpose of the study

The current study reveals the mobile networks which are used in the institution campus as well as university. Also this study discusses the way to develop education and exchange information through mobile network. This article talks about, how to improve the learning through mobile function.

Review Literature

Klopfer, (2008) has conducted a study on "Augmented Learning: Research and Design of Mobile Educational Games"

New technology has brought with its new tools for learning, and research has shown that educational potential of video games resonates with scholars, teachers, and students alike. In "Augmented Learning", Eric Klopfer describes the largely untapped potential of mobile learning games played on such handheld devices as cell phones, Game Boys, and Sony PSPs to make a substantial impact on learning. Examining mobile games from both Educational and gaming perspectives, Klopfer argues that the strengths of the mobile platform and its portability, context sensitivity, connectivity, and ubiquity--make it ideal for learning games in Elementary, Secondary, University, and lifelong education. Klopfer begins by exploring the past and present of Education, Educational Technology, 'Edutainment', and mobile games, and then offers a series of case studies of mobile educational games that have been developed and implemented in recent years. These games either participatory (which require interaction with other players) or augmented reality (which augment the real world with virtual information)--can be produced at lower cost than PC or full-size console games. They use social dynamics and real-world contexts to enhance game play, can be integrated into the natural flow of instruction more easily than their big-screen counterparts, and can create educational compelling and engaging environments for learners. They are especially well-suited for helping learners at every level development of twenty-first century skills, including the ability to tackle complex problems and acquire information in 'just-in-time' fashion. All of this, Klopfer argues to put mobile learning games in a unique and powerful position within educational technology.

Buesing, & Cook (2013) have conducted a study on "Augmented Reality Comes to Physics"

Augmented Reality (AR) is a technology used on computing devices where processor-generated graphics are rendered over real objects to enhance the sensory experience in real time. In other words, what we are really

seeing is augmented by the computer. Many AR games already exist for systems such as 'Kinect' and 'Nintendo 3Ds' and mobile applications, such as 'Tagwhat' and 'Star Chart' (a must for astronomy class). The yellow line marking first downs in a televised football game and the enhanced puck that makes televised hockey easier to follow, both use augmented reality to do the job.

Bower, Howe, McCredie, Robinson, & Grover (2014) have conducted a study on "Augmented Reality in Education Cases, Places and Potentials"

Augmented Reality is poised to profoundly transform Education as we know it. The capacity to overlay rich media onto the real world by viewing through web-enabled devices such as phones and tablet devices means that information can be made available to students at the exact time and place of need. This has the potential to reduce cognitive overload by providing students with perfectly situated scaffolding", as well as enable learning in a range of other ways. This article studies the uses of Augmented Reality both in mainstream society and in Education, and discusses the pedagogical potentials afforded by the technology. Based on the prevalence of information delivery uses of Augmented Reality in Education, researchers argue the merit of having students design Augmented Reality experiences in order to develop their higher order thinking capabilities. A case study of "learning by design" using Augmented Reality in HighSchool Visual Art is presented, with samples of student work and their feedback indicating that the approach resulted in high levels of independent thinking, creativity and critical analysis. The paper concludes by establishing a future outlook for Augmented Reality and setting a research agenda going forward.

Latif (2012) has conducted a study on "CARE: Creating Augmented Reality in Education"

Latif's paper explores, how Augmented Reality using mobile phones can enhance teaching and learning in education. It specifically examines its application in two cases, where it is identified that the agility of mobile devices and the ability to overlay context specific resources offers opportunities to enhance learning that would not otherwise exist. The technologies that will be used to develop these resources are considered, along with logistical issues surrounding affordability, security and safety issues of mobile devices.

Lee (2012) has conducted a study on "The Future of Learning and Training in Augmented Reality"

Students acquire knowledge and skills through different modes of instruction that include classroom lectures with textbooks, computers, etc. The availability and choice of learning innovation depends on the individual's access to technologies and on the infrastructure environment of the surrounding community. In this rapidly changing society, information needs to be adopted and applied at the right time and right place to maintain efficiency in all settings. Augmented reality is the technology that dramatically shifts the timing and location of learning. This paper describes augmented reality, how it applies to learning, and its potential impact on future education.

Mobile Applications and Challenges

Mobile applications and challenges are the recent advances to the application areas where mobile augmented reality systems are used. This is not an extensive chronological list as having aim to complement the most recent surveys from Azuma, Billinghurst, Schmalstieg, and Hirokazu, (2004) who studied the convergence of the augmented reality, ubiquitous and wearable computing. The Mobile Augmented Reality applications' study covers:

- Virtual Character-based applications for augmented reality.
- Cultural Heritage.
- Edutainment and Games.
- Navigation and Path-Finding.
- Collaborative assembly and design.
- Industrial maintenance and inspection.

Education and Augmented Reality

Augmented reality applications can complement a standard curriculum. Text, graphics, video and audio can be superimposed into a student's real time environment. Textbooks, flashcards and other educational reading material can contain embedded 'markers' which are when scanned by an AR device, produce supplementary

information to the student rendered in a multimedia format. Students can participate interactively with computer generated simulations of historical events, exploring and learning details of each significant area of the event site (Lubrecht, 2012). Augmented reality can aid students in understanding subjects by allowing them to visualize the concept and interact with a virtual model of it that appears, in a camera image, positioned at a marker held in their hand. Augmented reality technology also permits learning via remote collaboration, in which students and instructors are not at the same physical location and can share a common virtual learning environment populated by virtual objects and learning materials and interact with another within that setting.

Augmented Reality in Classroom Setting

Modern classrooms are frequently enhanced through the addition of new technologies, such as multi-media and computer gaming technologies, and augmented reality is one of these new technologies. Research has shown that learning does occur in virtual environments, and one of the earliest works in this area, applying augmented reality to an educational context, is the 'Classroom of the Future', which conceptualizes how it could be possible to enhance the interaction between instructor and students by employing augmented reality technologies. Augmented reality was influenced directly by its perceived usefulness, and indirectly through perceived ease of use and social influence, and preliminary results seemed to indicate the participants' intention to use augmented reality for learning. The importance of augmented reality is to implement novel technology to enhance learning approaches in education.

Learning in Augmented Reality

Apart from the subject content itself, pedagogical and psychological issues also need to be considered when designing a higher education learning system. The shared presence of virtual environments can enhance the opportunities for effective educational applications. As an extension to augmented reality systems, it can be extremely effective in providing information to a user who deals with multiple tasks at the same time. Educators not only need to recognize a unique learning style, but also recognize this AR correctly for the successful development of effective learning and teaching strategies. The potential benefits of augmented reality applied to higher education include: multi-modal visualizations of difficult theoretical concepts, practical exploration of the theory through tangible examples and natural interaction with multimedia representations of teaching material. It is also important to consider the technological issues when introducing augmented reality into teaching and learning processes.

A focus on learning through interaction with 'reality' directs researchers to situated theories of learning and a careful attention to context. Developers, educators and e-learning designers often lack clarity regarding the impact that a student's situation has on their interpretation of e-learning. Bowker and Star (2000) took the concept of 'situated' learning further by suggesting and also considering issues of space and time in any learning process. Latour (1999) had emphasized our need to create order in these processes. The reality is continually mediated and reinterpreted by our practices and meaning-making exercises. At a first glance, the shift from low-tech to mobile-tech and to augmented reality may seem merely quantitative: Augmenting/adding to reality has always been a part of outdoor education, whether it is through informative signposts at a site, costumed re-enactments of historical events, or straightforward on-site tuition by a teacher or parent. It is necessary to change our perspectives, understanding and meaning-making of reality by augmenting it with additional information. Technology merely offers systems and resources that can enhance our situated learning by augmenting our realities more effectively. Yet, it is needed to consider how new technologies might offer the potential for qualitative changes in our relationship with reality; imagine a learner leaving a 'video note' for peers at a historical point of interest; viewing a geographical site as it would have looked during an Ice Age; or collecting audio-visual notes of observations. Such experiences transform reality into a multi-modal social text, as described by Bezemer and Kress (2008). The use of augmented reality in education, and particularly in mobile learning, is still in its infancy and it remains to be seen how useful it will be in creating effective learning experiences. The overview of learning activities shows that augmented reality can be used successfully for

situated and constructivist learning, particularly, when collaboration and student inquiry are processed. Augmented reality also shows and supports informal learning experiences (FitzGerald, Ferguson, Adams Gaved Mor & Thomas 2013).

Roles of Space in Learning with Augmented Reality

When considering augmented reality, people need to take into account the environment that is being augmented, in order to understand what spatial components can be augmented and why they might want to do this. Dourish (2006) presents the environment as a duality analogous to the house comparison. He distinguishes between "space" (the physicality of our surroundings and their structures, which may enable or constrain our movements or interactions) and "place" (the social, cultural and historical contexts we associate with such settings, acquired through our interactions with them). We can also consider the "affordances" of such spaces, a term employed to describe perceived properties which facilitate particular actions, for example, a chair affords sitting; a pen affords writing. Bligh and Crook provide an excellent overview of how spatiality impacts upon technology-enhanced learning, discussing at the lengthy notion of "learning spaces" in terms of the design and evaluation of learning activities (Bligh & Crook, 2014).

Spaces for Learning

Bligh and Crook (2014) identify several affordances of spaces for learning as follows:

- Impeding: Students may be inhibited by the space around them.
- Containing: The layout of a space may restrict/ challenge, or support/enhance, learning interactions.
- Stimulating: Spaces can be used to stimulate learners' thinking and to encourage physical exploration.
- Associative: Observed that the experience of place is dependent upon 'semantic tangles' of people.
- Constitutive: It forms part of the physical environment in which it is located.
- Socially constitutive: Social space is both produced by and can afford social interaction by groups.

Scope of the Study

- Mobile augmented reality is the technology used for various purposes with the help of mobile. The mobile is used for the learning point, we say that m-learning.
- Mobile technologies with Educational Technology as the theory and practice of educational approaches to learning.
- Mobile technologies as technological tools, assisting in the communication of knowledge, and its development and exchange.
- Mobile technologies for learning system management
- Mobile technologies are informal learning contexts.
- Mobile technologies are informatics education and digital literacy.
- Mobile technologies help teacher educator to improve the professional development.
- Mobile technologies help to identify research needs and topics in the field of education.

Advantages of Mobile Augmented Reality for Learners

Besides bypassing learning, these tools can also be set up to support learning. Specifically these technologies are great at providing meta-cognitive information to your students. Mobile augmented reality provides learning designers and educators with a new opportunity to start thinking more deeply about the mobile learner's context and situation. In fact, the key thing to remember about mobile augmented reality is, that it is about augmenting experiences in real world environments. Augmented reality technologies can take any situation, location, environment, or experience to a whole new level of meaning and understanding. Augmented reality is uniquely changing the way people learn with mobile devices.

Uses of Mobile Networks in Universities

In Universities, the wifi-network was permitted for all learners for their educational purpose. Universities connect their e-library website with various educational links to collect the information, data, and review and so on. Also through network, many e-courses are organized by different educational institutions. It may be accessed through mobile network. Thus mobile augmented reality is an

effective tool for education.

Recommendation

The author has recommended that, every Educational Institution use the wifi-networks or the Bluetooth functions to exchange notes between the learners. But, they need to provide required infrastructure and facilities for the same.

Conclusions

The augmented reality technology is a promising and stimulating tool for learning and it can be effective when used in parallel with traditional methods. Although augmented reality has been around for a while, now only recent researches have started, designed and implementing experimental applications including entertainment, education, construction, collaborative design, military, archaeology and many others. However, many issues related to technology remain to be improved as well as wide ranging user studies within universities must be completed before augmented reality learning environments can become a standard component of Higher Education. In educational institution or Universities they provide wifi-networks for the students to augment their learning. Thus this article concludes that the Mobile Augmented Reality enhances Education.

Reference

[1]. **Azuma, R., Billinghurst, M., Schmalstieg, D., Hirokazu, K. (2004).** *Developing Augmented Reality Applications*. ACM SIGGRAPH 2004 Course Notes.

[2]. **Bezemer, J., & Kress, G. (2008).** Writing in Multimodal Texts A Social Semiotic Account of Designs for Learning. *Written Communication*, Vol. 25(2), pp. 166-195.

[3]. **Bligh, B., & Crook, C. (2014).** Learning Spaces: departure points for a spatial turn in Technology Enhanced Learning. In E. Duval, M. Sharples & R. Sutherland (Eds.), *A Reader in Technology-Enhanced Learning*. Berlin: Springer.

[4]. **Bowker, G., C., & Star, S., L. (2000).** *Sorting Things Out: Classification and Its Consequences*. Cambridge, MA: MIT Press.

[5]. **Bower, M., Howe, C., McCredie, N., Robinson, A., & Grover, D. (2014).** Augmented Reality in Education-Cases, Places and Potentials. *Educational Media International*, Vol. 51(1), pp. 1-15.

[6]. **Buesing, M., & Cook, M. (2013).** *Augmented Reality Comes to Physics*. American Association of Physics Teachers. One Physics Ellipse, College Park, MD 20740. Vol. 51(4), pp. 226-227, ISSN: 0031-921X. Retrieved from the ERIC database.(Ej1014975).

[7]. **Dourish, P. (2006).** Re-space-ing place: "Place" and "space" ten years on. In *Proceedings of the 20th Anniversary Conference on Computer Supported Cooperative Work (CSCW'06)*, Banff, Alberta, Canada.

[8]. **FitzGerald, E., Ferguson, R., Adams, A., Gaved, M., Mor, Y., & Thomas, R. (2013).** Augmented reality and mobile learning: the state of the art. *International Journal of Mobile and Blended Learning*, Vol. 5(4), pp. 43-58.

[9]. **Graham, M., Zook, M., and Boulton, A. (2012).** Augmented reality in urban places: contested content and the duplicity of code. *Transactions of the Institute of British Geographers*, DOI: 10.1111/j.1475-5661.2012.00539.x.

[10]. **Haag, J. (2013).** *Using Augmented Reality for Contextual Mobile Learning*. Retrieved from http:// www.learningsolutionsmag.com/articles/1310/using-augmented-reality-contextual-mobile-learning.

[11]. **Klopfer, E. (2008).** *Augmented Learning: Research and Design of Mobile Educational Games*. MIT Press (BK), Retrieved from the ERIC database.(Ed524515).

[12]. **Latif, F. (2012).** CARE: Creating Augmented Reality in Education. Association for the Advancement of Computing in Education, Paper presented at *EdMedia 2012: World Conference on Educational Multimedia, Hypermedia and Telecommunications.*

[13]. **Latour, B. (1999).** Pandora's Hope. *Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.

[14]. **Lee, K. (2012).** The Future of Learning and Training in Augmented Reality-In Sight, *A Journal of Scholarly Teaching*, Vol. 7, pp. 31-42.

[15]. **Lubrecht, A. (2012).** *Augmented Reality for Education*. Digital Union, The Ohio State University, Retrieved from http://en.wikipedia.org/wiki/Augmented_reality#cite_note-74.

[16]. **Widder, B. (2014).** Retrieved from http:// www.digitaltrends.com/mobile/best-augmented-reality-apps

ABOUT THE AUTHOR

D. R. Robert Joan is currently working as an Assistant Professor in Christian College of Education, Marthandam. He has five years of experience in the M.Ed. Department of M.E.T. College of Education. He has presented 14 papers at National level seminars and has published in 4 Journals.