International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

Integrating 'Ubiquitous Technologies' to Online Learning

Uday Nair

University of Sheffield Management School, United Kingdom

Abstract: ***Web 2.0 technologies has the potential to be engraved into the existing and new learning systems as standalone to support learners with different cognitive and learning styles, with different competencies to enhance their own learning experience in unison with their social lives. Thereby enabling learning as a part of their normal social lives. Apart from Web 2.0 technologies, hard-technologies like tablets, smart phone/normal phones, laptops along with network technologies like cloud computing etc, 3G/4G network etc could play an intrinsic role within current LE. This paper looks at this need to be explored, and to look into the implications of using Ubiquitous technologies like these at Universities/Colleges/Schools to support learner's engagement and motivation level.***

Keywords: Web 2.0, e-learning, ubiquitous technology, learning

1. Introduction to Ubiquitous technologies

Educational technology have grown in the last five decades through constant R&D, giving educators and learners access to a wider classroom, not restricted to traditional university classroom, using different forms of media, different forms of technologies made available, giving education a new mode of delivery (Jones *et al.*, 2004).

The term 'Ubiquitous Technology/ Computing' was coined by Mark Wesier in 1991, wherein he refers to the process of integrating computers into the real physical world (Wesier, 1991).

When computers came into existence, the initial focus of everyone during that time was much on the screen, the display, the fonts used etc but as time went by the focus of the users shifted onto the *activity* which could be carried out using the computers much similar to software's / hardware's today when they came, the focus was on presentation but as they became ubiquitous attention moved to the activity that it carried out (Jones *et al.*, 2004; Krumm, 2009).

This ubiquitous technology features *'many-to-one relationship'* in human computer interaction (Wesier, 1993). Using this feature, each learner/student has access to many devices within the ubiquitous space to interact/engage with different people and learning materials at the same time. Today students live in a media rich, globally connected and technologically well versed environment, making them creators of contents rather than being just consumers of audio, text and video available today in Web 2.0. Each of these technologies provides students/learners with a vehicle to interact with the technology, the online informative materials, collaborate with other learners and by doing so they are creating new learning opportunities for them to explore and to develop their own competences. Hence students today would want to learn/study in an environment which enables them to make use of the tools, they use for day to day activities, and which has become a part of them, rather than going to a traditional classroom where they are switched off from their digital environment and giving them the feel of sitting in an airplane (Jones *et al.*, 2004).This disconnect between students digital life and the University classroom life could be one of the reason for less engagement in the classroom, lack of motivation, high level of absenteeism etc. In order to reduce such things, it becomes important to bridge the gap through technology, though it cannot be guarantee better performance but some research (Apple, 2008, Escobar-Rodriguez *et al.*, 2012; Krumm, 2009) states that effective integration of personalized technologies into the current teaching practices at school, HE and University level can lead to high level of motivation and student achievements.

2. Why to make use of Ubiquitous technology in e-learning?

Education has undergone some changes with the onset of digital technologies providing transfer of information, data storage and different communication modes. As a result, today's students (from school to Universities) have access of wide array of digital tools. In the last five decades, education sector has seen the growth of e-learning and moving on to mobile learning act as a constant reminder of transformations occurring in the education sector. Today technology enabled by ubiquitous computing can be seen as the next big thing in education or could be argued as the new beginning, paving way for ubiquitous learning (u-learning). U-learning has the potential to be pervasive and persistent allowing students easy access to information in turn providing overall education with flexibility, transparency, adaptivity and fluidity (Jones *et al.*, 2004). Arguably u-learning has the potential to revolutionize the learning constructs of traditional learning process existing within Universities.

Social technologies like Facebook, Twitter etc has penetrated deep into the lives of students at Universities. These students are born at a time when ICT's are an integral part of everybody's daily life, wherein these systems are used for work, recreation and even to learn something new (Junco *et al.*, 2012).

The e-learning systems put in place in Universities guide students through the learning process but these systems have their own limitations ; lack of physical interaction, system not able to adhere to cognitive needs of different learners, difficult for some instructors to adopt etc (Wong, 2007). In

such times, learning systems should be made of technologies everybody uses on a day-to-day basis, easy to access types which could help ease the tension in a constantly changing e-learning technology environment.

Looking at a learner-centric environment, one of the factors involved is maintaining the enthusiasm and motivation of learners to learn new things, keeping them excited. In an online environment, one of the ways to build the motivation is to develop a virtual world wherein students could become a part of the educational process by exploring, playing, creating, sharing, collaborating with the learning materials made accessible through/using systems powered by ubiquitous technologies (Michailidou *et al.*, 2003). In doing so students are provided with an active, experiential, student centered, teacher facilitated online classroom environment which may not be possible in traditional classrooms.

Coming back to e-learning systems put in place at Universities, most of these technologies makes use of *'one size fits all'* approach. But with the help of Ubiquitous technologies the same e-learning technologies can be used to help/assist students learn more efficiently, effectively and affectively to not only engage students to learn but also to assist students in motivating themselves, guiding students through the 'learning road map' built as per the learning's needs and requirements of each students. By doing so, technological mediums could match each student's personality/identity, giving them the motivation to use systems to look out for additional information, like-minded people to collaborate, mediums to develop new contents and making those contents available to all over the internet (Gunasekaran, 2002). At present, e-learning systems used in Universities cannot offer multi-dimensionality, synchronous communications, active engagement etc the kind of features which needs to exist in a teacher-student relationship online even though blended with traditional learning setting. In order to achieve these features efforts have to be put into developing systems which are aligned with student's interaction's, with the existing technologies. With the help of ubiquitous technologies e-learning domain can provide students with flexibility, saving money, time management and motivation, learning at their own speed, having an active engagement with different forms of contents to gather information from, customized learning outcomes based on cognitive needs of different students, collaborating with students around the world from different cultural background (collaborative learning) and experiencing the learning world from a whole new dimension (experiential learning) through these engagements.

But such a change in the learning constructs with technologies would need active persuasion and developed plans of execution. In many cases the notion of blended learning could be the starting point for such transformations, slowly developing appeal among learners, trying to correct some of the teacher's beliefs towards the use of technology in learning (DeRounin *et al.*, 2005).

It is essential to raise, within the existing learning systems in universities learners with poor writing skills are at a disadvantage, as most of the assessment, students participate in are of communicating their views/thoughts in a text format and in such cases students who lack the writing skills will not be able to actively engage in the learning process online and can lead to misunderstanding with the tutors (Smith *et al.*, 2004). In such cases ubiquitous technologies has the potential to enable students to share journal, wherein they could reflect on their learning within a collaborative LE (Siragusa *et al.*, 2007). These journals could be in the form of text, audio and/or videos depending upon the cognitive and learning style of the learners. Apart from these features, ubiquitous technologies has the potential to add value to e-learning systems through features like

Table 1: Potential features of Ubiquitous technologies, adapted from Alonso et al., (2005) and Apple (2008)

Feature	Explanations
Dynamic Environment	Access to experts, access of free online informations in different formats, support asynchronous and synchronous connectivity
In real time	Contents available as and when required 24x7.
Collaborative Engagement	Learning from one-another through social networks Facebook, Twitter, Google+, Yahoo Messenger, Google Talk, MSN, SlideShare, Flickr,Google Docs etc
Customized to personal needs	Using tools as per each individuals learning and cognitive styles
Comprehension	Learning through different source of information and in different formats, finally choosing tools to ones own personality.
Community of learning	Enabling group of like minded people to come together to create a community of learners example: Research clusters.

Through the lens of learning theory like Blooms Taxonomy wherein it describes many traditional practices put in place when a students makes a transition from lower order thinking to high order skills acquisitions, but the same taxonomy does-not seem to take into account new process that can be put into place, made available through the Web 2.0. The revised Bloom's taxonomy (in the figure below) tries to portray how ubiquitous technologies could be incorporated into the existing blooms taxonomy.

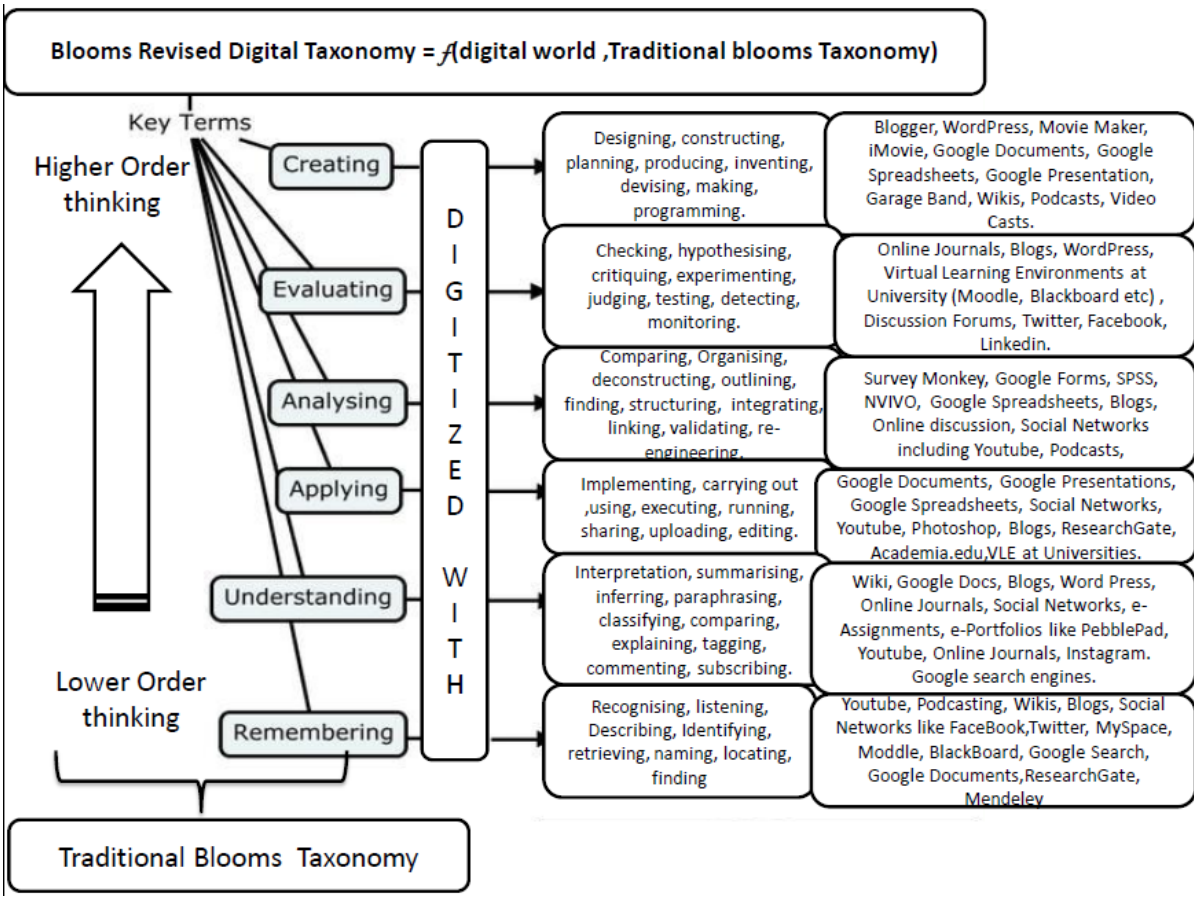

Figure 1: Revised Blooms Taxonomy adapted from Churches (2008)

The above figure, gives an indication how present technologies could be used by students under the guidance /facilitation of tutors onto how one could acquire the necessary thinking skills.

The motto behind the development of Web 2.0 was to create, share and collaborate, this in turn calls upon for active participation from users, creation of new materials and collaborating with peers and experts, all these features seems to fit in perfectly with activities (ideally) implemented at Universities to develop creativity, innovation, critical thinking and enhancing competencies in students by exposing them to multiple perspectives through group engagement and teacher- student interactions within a traditional classroom setting (Bennett *et al.*, 2012;Junco, 2012).

Table 2: Benefits of using Ubiquitous technologies in e-learning systems at Universities, adapted from Gunasekaran et al., (2002), Alexander (2001), Weller (2000)

Benefits of using ubiquitous technology in e-learning systems at Universities
Betterment in the quality of learning and enhanced enthusiasm in students for acquiring it
Improved access to education, training and development from different sources made available through the World Wide Web.
The cost of education significantly reduced (almost free like edX etc)
Improving the cost effectiveness, time efficiency , student teacher relationship within the existing education practices put in place at Universities.

3. Designing Ubiquitous Learning Environment (ULE)

Learning theories and their right application plays a key role in the design of ULE's. One of the reason is, learning theories helps building relationships between learner, information sources, the facilitator and other stakeholders within the LE (Jacobs, 1999). Developing and fostering such a relationship within the LE is essential as Gersten *et al.*, (1998) points out, would help students understand and make complete realization of what one is studying at the University, for example if students could see how things are done, they would be more able to retain and process the visual data than to just hear about it from the lecturer; this could enable students to understand the under pinned meaning of information they are gathering and their relevance in their own life and in the real world.

The VLE's used within Universities rely mostly on text-based communications; these systems lack visual-audio

capabilities. In such scenarios Ubiquitous technologies could provide not only text, but also video, audio and touch based systems at the disposable of the students. Hence when it comes to using Ubiquitous technologies, a good balance between the *course structure* and *mode of delivery (*including the online activities students should engage in) must be maintained in order to provide an optimal, value-add learning experience (Vrasidas, 2000).

With Ubiquitous technologies like Facebook, Twitter, Podcasts etc it would be possible to embed collaborative work and group brainstorming into existing design of e-learning systems. This would enable learners, free from space and time to interact with each other. Using systems, used by students as a part of their social activities, students might find it difficult to accept social and learning activities done together using the same system probably at the same time, but over a period both the activities would assimilate into one and thereby becoming a part of the student's daily routine in/outside University. When designing systems using Ubiquitous technologies due consideration should be given to the quality assurance factors pointed out by Alley *et al., (*2001) which would have an impact on student engagement and their level of satisfaction while using such diverse online systems.

Table 3: QA factors under pinning Ubiquitous e-learning systems adapted from Alley et al., (2001)

Quality Assurance Factors underpinning Ubiquitous e-learning systems.
Construction of Knowledge
Self Paced learning
Active Learning
Moving up the pyramid of Blooms taxonomy from Lower order skills to higher order skills
Personalized learning depending upon on one's cognitive and learning styles
Experiential Learning in accordance to Kolb(1984)
Social and authentic learning
Epistemological assumptions needs to be constantly checked/eveluated
Constant evaluation of one's own learning cycle
Understanding the messiness of learning using different sources of information to analyze.

4. Conclusion

Technology is growing at a rapid rate and advances taking place in the domain of ICT's, digital networks, mobile computing, handheld devices, social networks etc has an impact on the way we work today. These technological leaps have transformed the way we communicate with the technologies themselves and how we use these technologies to interact with other socially. But there is still a gap which needs to be bridged to transcend the growth of such technologies onto the learning, education and training domains.

ULE has the ability to impart knowledge, develop competencies, and engage/amaze learners with variety of media resources and mobile applications. But the success of these ubiquitous technology powered learning environment depends on how the system is designed, implemented and evaluated. As highlighted above there are some benefits of using ubiquitous technologies into the current online/offline learning environment but there are some issues like the design frameworks, quality assurance, maintaining the motivation level of the learners through the learning cycle which needs to be explored and research upon.

Ubiquitous Learning Environment to some may sound futuristic and ambitious but over time just like any other technology they would blend into our day to day lives and we would be able to adapt to the new technologies and the pedagogy that might emerge from it, which could be seen as a new hope for the future of education.

References

[1] Alexander, S., (2001), *E-Learning developments and experience*, Education+Training, Vol.43, No.4/5, pp 240-248.
[2] Alley, L. R., Jansak, K.E., (2001), *Ten keys to quality assurance and assessment in online learning*, Journal of Interactive Instruction Development, Vol.13, No.3, pp 3-18.
[3] Alonso, F., Lopez, G., Manrique, D., Vines, J.M., (2005), *An Instructional model for web-based e-learning education with a blended learning process approach*, British Journal of Education technology, Vol.36, No.2, pp 217-235.
[4] Apple, (2008), *Apple classrooms for tomorrow-Today : Learning in the 21st Century*, [online accessed on 13 April, 2012], http://education.apple.com/acot2/global/files/ACOT2_Background.pdf
[5] Bennett, S., Bishop, A., Dalgarno, B., Waycott, J., Kennedy, G., (2012), *Implementing Web 2.0 technologies in higher education: A collective case study*, Computer and Education, Vol.59, Issue 2, pp 524-534.
[6] Chruches, A., (2008), *Bloom's Taxonomy blooms digitally*, [online accessed on 12, September, 2013], http://www.techlearning.com/studies-in-ed-tech/0020/blooms-taxonomy-blooms-digitally/44988
[7] Derouin, R.E., Fritzsche, B.A., Salas, E., (2005), *E-Learning in organizations*, Journal of Management, Vol.31, No.6, pp.920-940.
[8] Escobar-Rodriguez, T., Monge-Lozano, P., (2012), *The acceptance of Moodle technology by business administration students*, Computers and Education, Vol.58, pp 1085-1093
[9] Gersten, R., Baker, S., (1998), *Real world use of scientific concepts: Integrating situated cognition with explicit instruction*, Exceptional Children, Vol.65, No.1, pp 23-36.
[10] Gunasekaran, A., McNeil, R.D., Shaul, D., (2002), *E-Learning: Research and Applications*, Industrial and Commercial Training, Vol.34, No.2, pp 44-53.
[11] Jacobs, M., (1999), *Situated Cognition: Learning and Knowledge Relates to Situated Cognition*, [online accessed 11 December 2011] http://www.gsu.edu/~mstswh/courses/it7000/papers/situated.htm
[12] Jones, V., Jo, J.H., (2004), *Ubiquitous LE: An adaptive teaching system using ubiquitous technology*, In R.

Atkinson, C. McBeath, D. Jonas-Dwyer & R. Phillips (Eds), Beyond the comfort zone: Proceedings of the 21st ASCILITE Conference (pp. 468-474. Perth, 5-8 December.

[13] Junco, R., (2012), *The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement*, Computers and Education, Vol.58, pp 162-171

[14] Krumm, J., (2009), *Ubiquitous Computing Fundamentals*, CRC Press, Taylor Francis Group, September, 2009.

[15] Michailidou, A., Economides, A., (2003), E-*learn: Towards a collaborative educational virtual environment*, Journal of Information Technology Education, 2, 131-152. Retrieved from http://jite.org/documents/Vol2/v2p131-152-92.pdf

[16] Siragusa, L., Dixon, K.C., Dixon, R., (2007), *Designing quality e-LEs in higher education*, In ICT: Providing choices for learners and learning. Proceedings ascilite Singapore 2007. [accessed on 12 November 2011] http://www.ascilite.org.au/conferences/singapore07/procs/siragusa.pdf

[17] Smith, A.D., Rupp, W.T., (2004), *Managerial Implications of computer-based online/face-to-face business education: a case study*, Online Information Review, vol.28, no.2, pp.100-109.

[18] Vrasidas, C., McIssac, M.S., (2000), *Principles of Pedagogy and Evaluation for Web based learning*, Education Media International, [online access 17 May 2012], http://vrasidas.com/wp-content/uploads/2007/07/webasedemi.pdf

[19] Weiser, M., (1991), *The computer for the twenty-first century*, Scientific American, September 1991, 94-104.

[20] Weiser, M., (1993), *Some computer science issues in ubiquitous computing*, Communications of the ACM, Vol.36, No.7, pp 74-83. In Special Issue, Computer-Augmented Environments [online access 2 Feburary, 2012] http://www.ubiq.com/hypertext/weiser/UbiCACM.html

[21] Weller, M.J., (2000), *Creating a large scale, third generation distance education course*, Open Learning, Vol.15, No.3, pp 243-252.

[22] Wong, D., (2007), *A Critical Literature Review on e-Learning Limitations*, Journal for the Advancements of Science and Arts, Vol.2, January 2007, pp 55-62.

Author Profile

Uday Nair is currently a researcher at University of Sheffield. My research interest are 'Web 2.0', 'e-learning', 'Ubiquitous technologies', 'social media', 'systems thinking', 'instructional design', 'education', 'green computing'. Prior to PhD study, he did Bachelors in Computer Engineering from Fr. Conceicao Rodrigues College of Engineering, University of Mumbai. I also did my MBA (Finance) from the Management School, University of Sheffield. He has worked in the corporate sector within the construction and food processing industry prior to pursuing my MBA and post MBA. He has done consultancy projects for different companies around the world. He is actively engaged academically at University of Sheffield, University of Liverpool and at Grenoble Graduate School of Business. Apart from studying and working, he is engaged in fundraising activities for Asha for Education, Sheffield Chapter in UK who work towards supporting education for the Underprivileged children in India.