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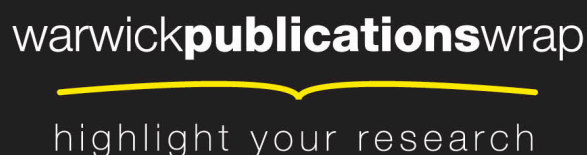
Micro Notes Application for Education: a Proposed Mobile Micro Note-taking Architecture

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Abstract: Given the massive uptake in the domain of information and communication technology, there is great potential for integrating social media technologies with learning processes at universities. Social Network Sites (SNS), e.g. Twitter and Facebook, have been used in various educational activities. However, the use of such sites in educational activities is still generic often confining itself to aspects related to creating module notebooks. Hence, this study aims to employ SNS, and more specifically the features of Twitter, in the educational process so as to make it more effective than has been the case hitherto. Mobile technologies have also formed the basis for innovative note-taking solutions to be used by students in the classroom to cover the shortcomings of traditional notes. Based on mobile technologies and SNS features, this study proposes an architecture that provides undergraduate students with a new innovative note-taking tool. The architecture has been proposed to fit the students' needs at higher education level as regards their note-taking practice. The proposed architecture was built based on a MVC three tier model that is used for interaction application. This issue has not been investigated in the literature and thus its usefulness to the learning process is still unexplored.

Keywords: Note-taking, Twitter in Education, Micro Note-taking, Mobile Technology, Architecture

1. Introduction:

Social Network Sites (SNS) have been used recently as a new trend in learning and teaching in higher education. Most current students have grown up in the digital age where this technology is present in all areas of their lives including their learning and teaching activities. In fact, Twitter is one of the most popular platforms that have been recently employed in teaching and learning. For example, Dhir et al. (2013) show that a significant growth in the popularity of Twitter is in the educational sector. Similarly, mobile technology has increasingly been used in learning and teaching in higher education. According to Traxler (2007) using wireless, mobile and handheld devices has gradually increased and been disseminated across educational sectors. Personal mobile devices are ubiquitous amongst student populations in universities (Herrington et al 2008). Keeping these advanced technologies mentioned above in mind, there would seem to be a clear need to investigate how these can be used to serve the note-taking practice in education.

Numerous studies have reflected an increased interest in using technologies for note-taking practice in education (Abowd et al., 1998; Aitken and Hatt, 2012; Truong, 1999; Zhang and He, 2004; Singh et al., 2004; Kam et al 2005; Berque 2006; Reilly and Shen, 2009; and Marrandino et al., 2011). However, none of these studies have focused on social network sites (SNS) or even the short text messages for note-taking practice in education and also have not used the three tier architecture (MVC) Model-View-Control pattern design

architecture. Hence, this paper is suggesting an architecture for note-taking practice in education that focuses on providing the two main functions of note-taking e.g. the encoding function and the recalling function using mobile technology and Social Network Sites features for current age students. The proposed architecture has been drawn based on two resources: the first resource was used in the light of the rich history of the literature review of research on mobile technology, Social Network Sites features and the note-taking activity. The second was the result of an exploratory study that was conducted at an early stage.

The most surprising result of the exploratory research was that traditional pen and paper was observed to be still the most favored tool used by undergraduate students for note-taking practice (Al-zaidi et al., 2013). Therefore, our innovative architecture developed here is based on critically analyzing the literature reviews in order to solve the problem of the untidy pen and paper medium and the lack of gaining the benefits of online learning. The literature reviews that have been used to help us in framing the idea of the proposed architecture will be discussed in the paper further. This paper introduces the proposed architecture in detail, followed by its evaluation technique, and finally the conclusions of the study.

2. Literature review:

2.1 Mobile technology:

In recent years, the quick growth of mobile technologies is promising a new revolution that might be comparable with that of the web (Trifonova and Ronchetti, 2003). Mobile technologies in education can help in supporting teaching and learning such as personal organization without explicitly being part of the learning activity themselves (Naismith et al 2004). M-learning can be considered as a learning tool for accessing content, which can be locally stored on the device or can be reached through interconnection (Trifonova and Ronchetti, 2003). The most obvious use of mobile devices for educational purposes is in fact a direct application of e-learning techniques on smaller devices instead of those on a desktop PC (Trifonova and Ronchetti, 2003).

2.2 Mobile learning:

Recently, rapid advances in mobile learning have been viewed as a major trend in higher education. Georgive et al. (2004) pointed out that m-learning offers a new way of learning and teaching, which redresses the deficiencies of traditional education. Indeed, Georgive et al. (2004) highlighted that m- learning is becoming a new form of learning worldwide that is based on mobile devices such as the PDA, cell phone and Tablet PC. According to (Herrington et al., 2008) and Sharples (2006) the use of mobile phones has already grown amongst students as well as across all educational areas. (Sharples et al., 2002) argued that handheld computers and mobile communication are technologies that can be used in supporting individuals to learn anytime, anywhere. Similarly, (Naismith et al., 2004) identified that mobile phones and personal digital assistants are the most prevalent technologies for mobile learning. Moreover, (Traxler, 2007) emphasizes that mobile learning has been growing obviously and significantly in higher education.

(Alexander 2004) stated that students learn more effectively with mobile devices than they do with desktop computers. According to Evans (2008), using m-learning as a teaching and learning strategy for college students appears to be an effective tool in higher education. Another study by (Fozdar and Kumar, 2007) indicated that using m-learning could help in improving students retention by enhancing the delivery of education. (Traxler, 2005) highlighted that m-learning is a new educational format. Hence, this strongly suggests that m-learning is an innovative educational tool, since many researchers attempted to investigate how the mobile technologies can be employed for educational activities.

2.3 Mobile device

Personal mobile devices are ubiquitous amongst student populations in universities (Herrington et al., 2008). Mobile devices perform many of the functions of desktop computers with the advantages of simplicity in that they are 'easy to carry' and give improved access everywhere, anytime (Houser et al., 2002). Widespread ownership of mobile phones and the availability of other portable and wireless devices have been the landscape of technology-supported learning (Kukulska-Hulme, 2009). These technologies turn out to be well aligned with strategic educational goals such as improving students retention (Kukulska-hulme, 2007). Personal digital assistants and mobile phones are the most commonly used technologies for mobile learning (Naismith et al., 2004). Individuality is one of mobile devices' properties such as personal digital assistance (PDA) that generates unique educational affordances (Klopfer et al., 2002).

2.4 Note-taking

Note-taking is one of the most important activities used in learning processes and has proven its positive impact on students' achievement (Kiewra, 1987; Piolat et al., 2005). Note-taking is one of the most commonly used techniques by students during lectures (Hartley and Davies, 1978). Traditionally, this course of action is usually conducted manually (i.e. pen and paper). In recent years, Web 2.0 technologies such as blogs, wikis, and social networking sites have been used to transform teaching and learning in higher education given that such technologies offer software developers and end-users the ability to create and modify content online. Web 2.0 technologies have actually been used in a number of educational activities (e.g. communications, discussions, and note-taking) that are carried out by students in classroom settings. These activities appear to be more interesting and appealing to students when they are enabled by Web 2.0 technologies and thus we assume that such technologies have the potential to enhance their learning skills.

2.5 Twitter in Education

Twitter has been deployed in a number of ways in higher education (Leaver, 2012). To give just a few examples, it was found that one of the advantages of using Twitter in a classroom setting is that it offers students an additional channel for communication (Tyma, 2011,). Scornavacca et al. (2009) also found that for handling questions in a large classroom, text messages can be used as a more practical and efficient way than the traditional raising-hand method. However, a survey of faculty members, guests, and students on a pharmacy management course that was conducted by Fox et al. (2011) showed that although 80% of the sample found that Twitter facilitates class participation, 71% and 69% of the sample, however, indicated that Twitter was distracting, and actually prevented note-taking, respectively. Hence, using Twitter during lectures to get involved in classroom activities seems to be annoying for instructors leading classes (Hartman and McCambridge., 2011). In line with this, Cherney (2008) argued that students who use Twitter will lose the space for thinking in depth compared to traditional teaching in classrooms.

On the other hand, some studies argue that the use of Twitter in classroom settings is advantageous. For example, Junco et al. (2010) argued that using Twitter changes the way traditional activities take place in classrooms and leads to keeping students engaged. Accordingly, the literature shows inconsistent results regarding the appropriateness of using Twitter in classroom settings and for educational purposes. A plausible explanation is that Twitter and similar social networking sites are not specifically designed as an educational tool that supports the learning process.

Microblogging is a form of communication that allows people to generate content by posting short posts limited to 140 characters. One of the most popular microblog tools is Twitter, with more than 6 billion users as of Jan, 2014 according to Statistic Brain. A survey conducted by Cheng et al. (2009) showed that 65% of Twitter users are under the age of 25. Junco et al. (2011) found that Twitter has been used in teaching and learning amongst the students. Most

studies of using Twitter in classrooms have focused on Twitter as a feedback tool between teachers and students (Kassens-Noor, 2012). Another study by Chamberlin et al. (2011) suggested that Twitter is a simple tool allowing students to post short text messages of just 140 characters or less in educational fields. According to Faculty Focus Statistics (2010) Twitter has become a very popular learning tool in the educational setting among both teachers and students. Recent evidence showed that Twitter has a significant impact on students' engagement in learning processes (Junco et al., 2010). However, another study by Fox et al. (2011) indicated that using Twitter in the classroom environment is distracting and by far the major percentage of participants said it prevented note-taking.

2.6 Micro Note-taking

Katayama and Crooks (2003) have highlighted that online educators have had to reconsider the popularity of the alternative mode of learning with technology, as a consequence of the widespread emergence of electronic notes and text. Therefore, Micro Note-taking has been defined earlier in this research by (Al-Zaidi et al., 2013) as a small-sized class of remarks that serve as an initial reservoir of presented information for future uses. This paper attempts to describe the proposed Micro Note-taking application as follows: learners are not using modern tools efficiently for note-taking activity during lectures and using pen and paper is outmoded and although not necessarily bad is far from being a good tool. The development of online Micro Note-taking Application is based on facts that are gleaned from the literature reviews regarding the benefits of online learning using mobile technology in learning. Also, it attempts to address the major shortcoming that has been revealed from the learners' perspective with regard to the note-taking activity. A simple solution will be developed for the leaners which is based on a short text message of Twitter taken by individual learners on their mobile devices from the presented information during lectures such as: PowerPoint slides, writing on the board and material resources. The micro notes are short, managed and grouped into module notebooks using keywords so that they will be easy to recall later. To recall the information that was noted manually by using pen-and-paper would be a time consuming task as well as an untidy job for the learners. A Micro Note-taking Application will be deployed in the classroom environment on the learners' mobile devices via Internet connection as a modern tool for note-taking activity instead of using a traditional one.

3. Proposed Application Architecture

3.1 Physical Architecture

The proposed architecture was suggested to abstract the operation of the proposed application. The architecture for the proposed application basically was built upon two main resources: our vision in the light of the literature reviews and the outcome of the investigation's exploratory study that was carried out. Our application was built based on client server approach. A three-tier architecture was adopted to describe clearly the operations of the proposed application (as shown in figure 1).

According to the kind of mobile application type, Micro Note-taking application can be categorized as a mobile application based on web services that are accessible through web services protocol (*programmatic interface*) (Ghatol and Patel, 2012). These web services are as follow: adding module notebook, encoding the notes, recalling the notes, adding keywords and searching for the notes. The database was used as a main storage for the data application (Vicknair et al., 2010). MySQL was used to develop the database the most common used open source (Converse et al., 2013). PHP stands for Hypertext Processor is an open source, server side and HTML embedded web-scripting language (Converse et al., 2013). To ensure the connection between the database and mobile web application, PHP 5 will be used because it offers much-enhanced object programming functionality (Converse et al., 2013). Apache was used as a web server, as it is the most common used with PHP and MySQL (Converse et al., 2013).
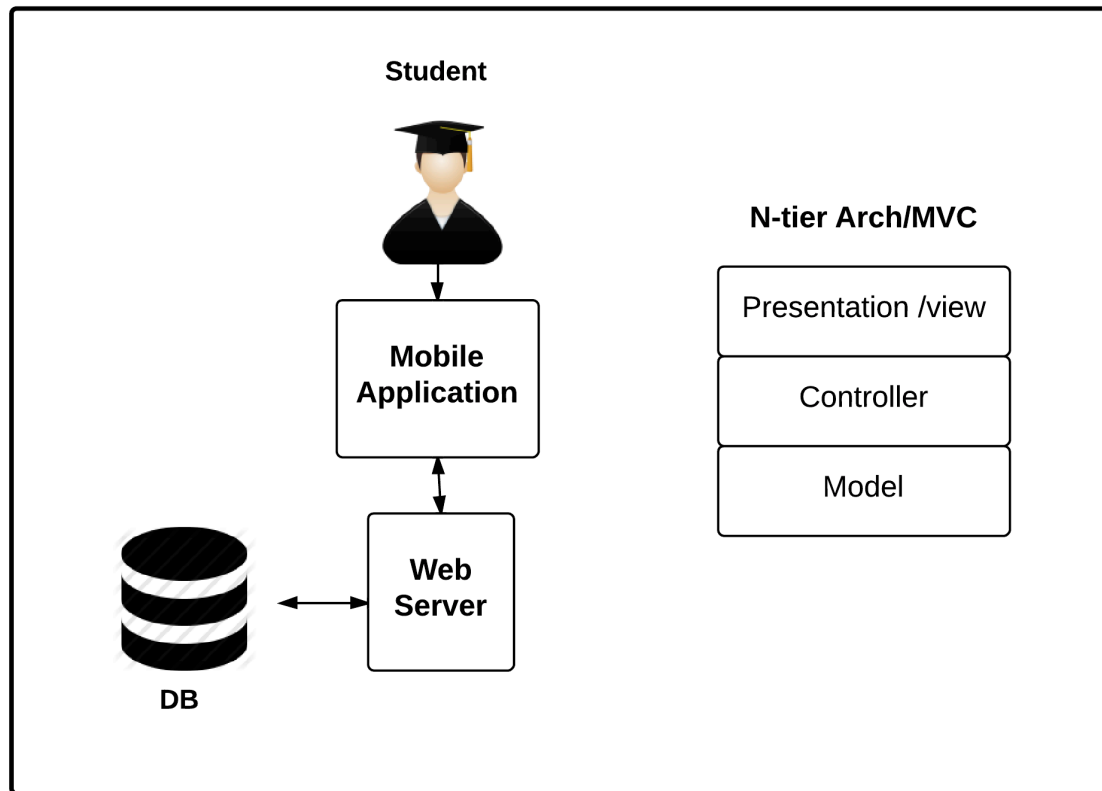
Figure 1: Micro Note-taking Application Architecture

4. Suggested Application Evaluation

The proposed architecture will be used to implement the initial prototype of the application for note-taking practice in education. The research method techniques will be applied here in order to improve the next version of the application. To achieve the research aim along with its objectives, this research follows the Design-Science Research (DSR) paradigm. This paradigm is deemed appropriate when a research aims to produce artefacts (i.e. utilities) that address the so-called wicked problems (Hevner et al., 2004). In principle, the design-science research attempts to successfully design, develop, and evaluate technology-oriented design artefacts characterized as novel, innovative, and purposeful. Design-science research, in general, aims to solve unstructured but relevant organizational or social problems through the development of novel and useful artefacts. As the current research aims to help in solving students' note-taking problems by developing a purposeful micro note-taking application, the design-science research paradigm is deemed fitting. First, this study will employ an experimental study design, involving a convenience sample of students to determine the impact of the micro note-taking experience. Then, a qualitative research method will be used for measuring different students' perspectives on the initial prototype. Patton (1990) pointed out that a qualitative research method can be used basically to gain two aspects: new opinions/ perspectives on things about which little is already known, or to gain more in-depth information that may be difficult to convey quantitatively. Therefore, a semi-structured interview and focus groups will be applied where the interviewer has the flexibility to explore and probe with this predefined list of questions and themes. The application will be implemented and then tested using a qualitative research method as mentioned above.

5. Conclusion

This paper presents a new architecture for note-taking practice in education based on Social Network Sites (SNS) and Mobile technology. The architecture will be used to formulate a stand-alone web-based mobile application. The application relies on mobile technology and use of one of the Social Network Sites features; specifically the use of just 140 characters to

post the generated content for note-taking practice. Model-View-Control (MVC) pattern design is the most widely used for interactive web based systems and was utilized to build the architecture. For the next version of the prototype application, users' feedback and views will be taken into consideration to improve it in relation to the students' needs. The final prototype will go through the evaluation stage with students at the University of Warwick to investigate and collect their views and perceptions about using this tool for note-taking practice.

As mentioned above, the proposed architecture stemmed from the literature review on note-taking practice as well as new technologies employed in education and the exploratory results were carried out to investigate the current note-taking practice for students to contribute knowledge helping to fill the gap of this research. The prime research evaluation technique for this application will be interviews to collect different views about a new application for note-taking practice. As discussed above, the system is still in the early stage of this research but it suggests an innovative approach for note-taking practice by integrating the social network sites features with mobile technology.

References

Abowd, G. Brotherton, J. and Bhalodia, J. (1998) "*Classroom 2000 : A System for Capturing and Accessing Multimedia Classroom Experiences"*, In Proceedings of CHI 98: Conference on Human Factors in Computing Systems Ap, Los Angeles.

Aitken, A & Hatt, G. (2012) "Students taking notes and creating summaries together (or not)". In A. Herrington, J. Schrape, K. Singh (Eds.), *Engaging students with learning technologies* (pp. 147-165). Perth, Australia: Curtin University.

Al-zaidi, M. Joy, M. and Sinclair, J. (2013) "*Exploring The Use of Micro Note-taking with Social Integration Features for Education",* In International Conference on Education and New Learning Technologies (EDULEARN13), Barcelona.

Alexander, B. (2004) "Going Nomadic: Mobile Learning in Higher Education", *EDUCAUSE Review*, Vol. 41, No. 2, pp 32-44.

Berque, D. (2006) "An Evaluation of a Broad Deployment of DYKNOW Software to Support Note Taking and Interaction Using Pen-Based Computers", *Journal of Computing Sciences in Colleges*, Vol. 21, No.6, pp 2–13.

Chamberlin, L. and Lehmann, K. (2011) "Twitter in higher education", *Cutting-edge Technologies in Higher Education*, Vol. 1, pp. 375-391

Cheng, A. and Evans, M. (2009) "*Inside twitter*", [online], http://www.sysomos.com/insidetwitter/

Cherney, I. D. (2008) "The effects of active learning on students' memories for course content", *Active Learning in Higher Education*, Vol. 9, No. 2, pp. 152–171.

Deacon, J. (2009) "Model-View-Controller (MVC) Architecture", JOHN DEACON Computer Systems Development, Consulting & Training, [online], http://www.jdl.co.uk/briefings%5CMVC.pdf

Converse, T. Park, J. and Morgan, C. (2004). PHP5 and MySQL Bible. Wiley Publishing, Inc.

Dhir, A. Buragga, k. and Boreqqah, A. (2013) "Tweeters on Campus : Twitter a Learning Tool in Classroom", *Journal of Universal Computer Science*, Vol.19, No. 5, pp. 672–691.

Evans, C. (2008) "The effectiveness of m-learning in the form of podcast revision lectures in higher education". *Computers & Education*, Vol. 50, No. 2, pp. 491–498.

Faculty Focus (2014) " Report Twitter in Higher Education 2010: Usage Habits and Trends of Today's College Faculty", [online], http://www.facultyfocus.com/free-reports/twitter-in-higher-education-2010-usage-habits-and-trends-of-todays-college-faculty/ - sthash.h3xpwjPY.dpuf

Fox, B. and Varadarajan, R. (2011) "Use of Twitter to encourage interaction in a multi-campus pharmacy management course", *American Journal of Pharmaceutical Education*, Vol. 75, No.5, pp. 1-8.

Fozdar, B. and Kumar, L. (2007) "Mobile Learning and Student Retention". *International Review of Research in Open and Distance Learning*, Vol. 8, No. 2, pp. 1–18.

Freeman, A. and Sanderson, S. (2011) "The MVC Pattern", *Pro ASP.NET MVC3 Framework*, pp. 63-88, Apress.

Georgiev, T. Georgieva, E. and Smrikarov, A. (2004) " M-learning-a New Stage of E-Learning", In *International Conference on Computer Systems and Technologies-CompSysTech*, Vol. 4, No. 28, pp. 1-4.

Ghatol, R. & Patel, Y. (2012) *Beginning PhoneGap*, Apress.

Hartley, J. and Davies, I. (1978) "Note taking : A critical review", *Innovations in Education & Training International*, Vol. 15, No. 3, pp. 207–224.

Hartman, J.L. and McCambridge, J. (2011) "Optimizing Millennials' Communication Styles", *Business Communication Quarterly*, Vol. 74, No.1, pp. 22–44.

Herrington, J. Mantei, J. Herrington, A. Olney, I. and Ferry, B. (2008) "*New technologies, new pedagogies : Mobile technologies and new ways of teaching and learning"*, The Australian Society for Computers in Learning in Tertiary Education Conference, [online], http://www.ascilite.org.au/conferences/melbourne08/procs/herrington-j.pdf

Hevner, A.R., March, S.T., Park, J., and Ram, S. (2004) "Design Science in Information Systems Research". *Management Information Systems Quarterly*, Vol. 28, No.1, pp. 75-105.

Houser, C. Thornton, P. Kluge, D. and Gakuin, K. (2002) "*Mobile Learning : Cell Phones and PDAs for Education"*, In Proceedings of the International Conference on Computers in Education.

Junco, R. Heiberger, G. and Loken, E. (2010) "The effect of Twitter on college student engagement and grades", *Journal of Computer Assisted Learning*, Vol. 27, No. 2, pp. 1– 14.

Kam, M. Wang, J. Iles, A. Tse, E. Chiu, J. Glaser, D. and Hall, S. (2005) " *Livenotes : A System for Cooperative and Augmented Note-Taking in Lectures",* In Proceedings of the SIGCHI conference on Human factors in computing systems, pp. 531-540, ACM.

Kassens-Noor, E. (2012) "Twitter as a teaching practice to enhance active and informal learning in higher education: The case of sustainable tweets", *Active Learning in Higher Education*, Vol. 13, No. 1, pp. 9–21.

Katayama, A. and Crooks, S. (2003) "Online Notes: Differential Effects of Studying Complete or Partial Graphically Organized Notes", *The Journal of experimental education*, Vol. 71, No. 4, pp. 293–312.

Kiewra, K. A. (1987) " Note taking and Review: the research and its implications", *Instructional Science*, Vol. 16, No. 3, pp. 233–249.

Klopfer, E. Squire, K. and Jenkins, H. (2002) "*Environmental Detectives: PDAs as a window into a virtual simulated world"*. In Wireless and Mobile Technologies in Education, Proceedings, IEEE International Workshop on IEEE, pp. 95-98.

Krasner, G. and Pope, S. (1988) A Cookbook for Using the Model- View-Controller User Interface Paradigm in Smalltalk-80. report, ParcPlace Systems, Mountain View, Calif.

Kukulska-hulme, A. (2007) "Mobile Usability in Educational Contexts : What have we learnt ?" *International Review of Research in Open and Distance Learning*, Vol. 8, No.2.

Kukulska-Hulme, A. (2009) " Will mobile learning change language learning?", *ReCALL*, Vol. 21, No. 2, pp. 157-165.

Leaver, T. (2012) "Twittering informal learning and student engagement in first-year units". In A. Herrington, J. Schrape, K. Singh (Eds.), *Engaging students with learning technologies* (pp. 97-110). Perth, Australia: Curtin University.

Marrandino, A. Sbattella, L. and Tedesco, R. (2011) "*Supporting note-taking in multimedia classes : PoliNotes"*, In 2011 International Conference in Information Technology Based Higher Education and Training (ITHET), pp. 1-8. IEEE.

Naismith, L. Lonsdale, P. Vavoula, G. and Sharples, M. (2004) "Literature Review in Mobile Technologies and Learning".

Patton, M. (1990) *Qualitative Evaluation and Research Methods*, Newbury Park, CA: Sage Publications, Inc.

Piolat, A. Olive, T. and Kellogg, R. (2005) "Cognitive Effort during Note Taking". *Applied Cognitive Psychology*, Vol. 19, No. 3, pp. 291–312.

Reilly, M. and Shen, H. (2009) "*The Design and Implementation of the Smartphone-based GroupNotes App for Ubiquitous and Collaborative Learning"*. In Proceedings of the 6th international conference on Ubiquitous and Collaborative Computing, pp. 46-55, British Computer Society.

Scornavacca, E. Huff, S. and Marshall, S. (2009). "Mobile phones in the classroom: If you can't beat them, join them", *Communications of the ACM*, Vol. *52, No.* 4, pp.142-146.

Sharples, M. (2006) " *Big Issues in Mobile Learning*", workshop by the kaleidscope Network of Excellence Mobile Learning Initiative.

Sharples, M. Corlett, D. and Westmancott, O. (2002) "The Design and Implementation of a Mobile Learning Resource". *Personal and Ubiquitous Computing*, Vol. 6, No. 3, pp. 220–234.

Singh, G., Denoue, L. and Das, A. (2004) " Collaborative note taking". In Wireless and Mobile Technologies in Education, 2004. Proceedings. The 2nd IEEE International Workshop, pp. 163-167.

Statisticbrain (2014) "Twitter Statistic/ Statistic Brain ", [online], http://www.statisticbrain.com/twitter-statistics/

Traxler, J. (2005) "Defining mobile learning". In IADIS International Conference Mobile Learning , pp. 251-266. Suomen kuntaliitto.

Traxler, J. (2007) " Defining, Discussing, and Evaluating Mobile Learning: The moving finger writes and having writ.… ", International Review of Research in Open and Distance Learning, Vol. 8, No. 2, pp. 1–12.

Trifonova, A. and Ronchetti, M. (2003) "Where is Mobile Learning Going ?", In World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education, Vol. 2003, No. 1, pp. 1794-1801.

Truong, K. N. and Abowd, G.D. (1999) " StuPad : Integrating Student Notes with Class Lectures", In CHI'99 Extended Abstracts on Human Factors in Computing Systems, pp. 208-209, ACM.

Tyma, A. (2011) " Connecting with What Is Out There! : Using Twitter in the Large Lecture", *Communication Teacher,* Vol. 25, No. 3, pp. 175–181.

Vicknair, C. Nan, X. Chen, Y. and Wilkins, D. (2010). A Comparison of a Graph Database and a Relational Database A Data Provenance Perspective,ACMSE ,pp. 68–80.

Zhang, Z. and He, L.W. (2004) " Notetaking with a Camera : Whiteboard Scanning and Image Enhancement. In *Acoustics, Speech, and Signal Processing, Proceeding (ICASSP'04),* Vol. 3, pp. 533–536.