Mobile Learning for Transforming Education and Improving Learning Outcomes on Agriculture in India

Aditya*[1] and Singh, S. R[2]
[1]Assistant Professor-cum-Junior Scientist, Department of Extension Education, Bihar Agricultural College, Bihar Agricultural University, Sabour-813 210, Bihar *Corresponding author Email: inc.aditya@gmail.com
[2]Chairman, Department of Extension Education, Bihar Agricultural College, Bihar Agricultural University, Sabour-813 210, Bihar Email: srs.sabour@gmail.com

The teledensity in India is estimated at 74.50 per cent (January, 2014) with an increase in subscriber base each day. No other revolution in the mankind has transformed the communication scenario to the extent as done by the mobile technologies. India has the fastest growing telecom network in the world with its high population and development potential base. Education is at a critical juncture in India. It is vital for workforce development and economic prosperity, yet is in need of serious reform so as to provide all the skills needed for a 21st century economy. Widespread use of smart phones by students has provided multiple opportunities to benefit from the mobile technologies at hand in a virtual self-paced environment. Mobile learning represents way to address a number of educational problems. The use of mobile technologies in education is the missing link which if properly harnessed has the potential to revolutionize the educational scenario of the country. Mobile devices, used in conjunction with near universal 2G/3G wireless connectivity, are essential tools to improve learning for students. This paper deals with the use of mobile technologies in the educational sector which can be implemented easily by the policy makers and implementing agencies to transform education on the whole, to engage students in a fruitful manner for bringing desired changes in the educational outcomes in agricultural section.

Keywords: Mobile learning, communication, learning, education, students, India

Received: 15 July2014, Reviewed: 21 September 2014, Revised: 28 October 2014, Accepted: 30 October 2014

1. Introduction

Mobile phones can bring revolution to the way education is imparted in India. The importance of this medium is slowly but steadily realized by players in the telecom industry, who are now developing the necessary applications to work towards mobile education (m-education or m-Learning) in various forms and measures. The rapid diffusion of mobile phones in society continues to transform the ICT landscape with major potential implications for education and the potential achievement of the millennium development goals. (Toyama, 2011). Along with new opportunities it has additionally created many new responsibilities for all involved in education. The ubiquitous access to technology have forced schools, education departments and a myriad of other stakeholder in the education domain to enter into conversations about utilizing mobile technology in particular towards learning gains. Over the last year or two, there has been an increased global awareness, specifically and increasingly amongst the corporate private sector and amongst the global agencies, donors and foundations, of the capacity of mobile technologies to deliver learning to people and communities beyond the reach of more conventional methods and established institutions.(Botha, 2012).The term m-Learning ("mobile learning"), has different meanings in different communities, covering a range of use scenarios including e-learning, educational technology and distance education, that focuses on learning with mobile devices at their own ease. Mobile learning is defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices". (Yeh, 2014). M-Learning technologies include handheld computers, MP3 players, notebooks, mobile phones, tablets and tablets. M-Learning focuses on the mobility of the learner, interacting with portable technologies, and learning that has a bearing on the society and its institutions that can accommodate and support an increasingly mobile population. The use of mobile tools for creating learning aids and materials has become an important part of informal learning. It is convenient in that it is accessible from virtually anywhere and is also collaborative. (Mehdipour, 2013).

2. Tele-density and Educational scenario in India

The subscriber base of mobile telephones is on a continuous rise in the country. The number of telephone subscribers in India increased from 935.81

million at the end of April, 2014 to 938.34 million at the end of May, 2014, thereby showing a monthly growth of 0.27 %(TRAI, 2014). The overall Tele-density in India increased from 75.38 at the end of April, 2014 to 75.51 at the end of May, 2014. It is interesting to observe that the rural areas are following this trend and are in no way behind. The major share in telephony is attributed to wireless subscriber base which increased from 907.44 million at the end of April, 2014 to 910.16 million at the end of May, 2014, registering a monthly growth of 0.30%. The overall wireless Tele-density in India has increased from 73.10 at the end of April, 2014 to 73.24 at the end of May, 2014. (TRAI, 2014).

TRAI (2014) also reports that the number of broadband subscribers increased from 61.74 Million at the end of April 2014 to 65.33 million at the end of May 2014 with monthly growth rate of 5.82%. Segment wise broadband subscriber base are as Table 2.

Better connectivity and increasing interest of the population (particularly the youth) provides a red carpet to the enabling of mobile learning in the country.

3. Youth and education in the country

There are now 1.3 billion young people in the age group of 12-24 in the developing world, a number expected to grow to 1.5 billion in 2035 and begin declining thereafter (Rao, 2011). As per the data of projected population by age, the proportion of Indian youth population in both the age groups increased from 2001 to 2006, thereafter there is a slight decrease in 2011 in the age group 15-19 years whereas there is a slight increase of the age group of 20-24 years nearing to equivalence in the proportions during this period. Henceforth, the proportion of both these age groups remains to be almost the same. (WPA, 2013)

The huge number of youth population estimating to about sixty million are illiterates and have not completed primary education – is a serious concern and demands attention of policy makers and planners of education. Keeping in focus the right to education and knowledge-driven society, India cannot afford to waste so much of its human resources (Majumdar, 2009).The need to address youth issues now is ingrained in demographics, due to the economic demands of the steep number of today's youth and its share in the future labour force. This large number contributing a larger share in the working age population is an opportunity for India. In order to reap this demographic dividend, India should invest in the education of youth to build human capital for future (Rao, 2011).

Table 1. Indian telecom statistics

Particulars	Wireless	Wireline	Total(Wireless +Wireline)
Total Subscribers (Million)	910.16	28.18	938.34
Urban Subscribers (Million)	533.94	22.31	556.25
Rural Subscribers (Million)	376.22	5.87	382.10
Overall Teledensity	73.24	2.27	75.51
Urban Teledensity	139.72	5.84	145.56
Rural Teledensity	43.72	0.68	44.40
Share of Urban Subscribers	58.66%	79.16%	59.28%
Share of Rural Subscribers	41.34%	20.84%	40.72%
No.of Broadband Subscribers (Million)	50.38	14.95	65.33

Source: Telecom Regularity Authority of India (TRAI, 2014)

Table 2. Subscribers of high speed broadband (≥ 512 Kbps download) in India

Sl. No.	Segment	Broadband Subscribers (in million)		% change
		Apr-14	May-14	
1.	Wired subscribers	14.91	14.95	0.25
2.	Mobile device users (Phones+Dongles)	46.42	49.97	7.66
3.	Fixed Wireless (Wi-Fi, Wi-Max, Point-to-Point Radio and VSAT)	0.41	0.41	0.16
Total		61.74	65.33	5.82

Source: Telecom Regularity Authority of India (TRAI), 2014

Table 3. Proportion of youth population (15 to 24 years) from 2001 to 2026

Age groups(years)	2001	2006	2011	2016	2021	2026
15-19	10.1	10.7	10.2	9.3	8.4	8.0
20-24	8.9	9.3	9.9	9.5	8.7	8.0

Source: Percentage distribution of projected population by age on March: 2001-2006, Office of the Registrar General and Census Commissioner, Government of India.

Table 4. Estimates of educational levels of youth population (15-24 Years)

Age group(years)	Level	Urban	Per cent	Rural	Per cent	Total	Per cent
15-19	Primary	0.48	13.3	1.48	17.8	1.96	16.45
	Upper Primary	1.07	29.8	2.53	30.4	3.60	30.22
	Secondary	0.97	27	1.44	17.3	2.41	20.22
	Higher Secondary	0.53	14.9	0.48	5.8	1.01	8.54
20-24	Primary	0.37	11.4	1.02	14.5	1.39	13.52
	Upper Primary	0.65	20.2	1.40	20	2.06	20.06
	Secondary	0.43	13.3	0.75	10.7	1.18	11.52
	Higher Secondary	0.58	17.9	0.65	9.3	1.23	12.02
15-24	Primary	0.84	12.39	2.50	16.29	3.35	15.09
	Upper Primary	1.72	25.22	3.93	25.64	5.66	25.51
	Secondary	1.40	20.47	2.19	14.28	3.59	16.18
	Higher Secondary	1.11	16.32	1.13	7.41	2.25	10.15

Source: Projected Population of Youth (15-24 Years) as per Population projections for India and states 2001-2006, Office of the Registrar General and Census Commissioner, Government of India, New Delhi, 2006.

4. Way forward with Mobile Learning

Change is a part of education. Educational institutions throughout the world are increasingly becoming interested in adopting alternative technologies as a model for imparting quality education to the learners from varied backgrounds (UNESCO, 2002). Mobile technologies may be front line in their capability to provide high-quality learning experiences, and satisfy the increasing demand for mobility and flexibility of the learners. In view of the ubiquitous presence of mobile technology with affordable smart phones and connectivity, there are favorable indications that the technology would be introduced as the next generation of learning platforms. Some of the institutions offering higher education have also implemented experimental initiatives for m-Learning that have been successful (Huang et.al, 2010). In a recent case study by Waard et al (2012), the merger of the Massively Open Online Course (MOOC) format with m-Learning is demonstrated. Futuristic m-Learning systems have already been developed in the United States as well as in several countries in Europe. The technology has already been proven as an effective medium for providing inexpensive distance education for varied purposes in Asian countries like South Korea, Bangladesh, Malaysia, and Japan (UNESCO, 2012). The conclusion from these studies is an assumption that the process would be challenging, especially when the traditional background of the educational institutions are taken into consideration. Wishart and Green (2010) consider that the most prominent challenge in the m-Learning process is the insufficient evaluation of implementation of the mobile technologies on a non-experimental basis. It is generally experienced that while the educational institutions are still prioritizing their strategy and operation in terms of adopting m-Learning principles, the technology itself is changing at a rapid pace. The main advantages of adopting an m-Learning platform for educational purposes would be an increase in the number of students having access to education as well as a reduction of setup costs for the educational institutions involved (Teall et al., 2011).

5. Literature review

The concept of M-Learning is often debatable. The main question pondered upon is the concept of mobile learning referring to the mobility of the student (Kukulska-Hulme and Traxler, 2007) or does the term reflect the mobile device itself (Traxler, 2013). Both points of view are equally relevant and have a significant impact on the implementation process. One aspect common to both is that the concept of M-Learning encompasses

learning within the traditional classroom setting as well as the possibility of formal/informal education outside the traditional classroom set up using any of the possible mobile devices. It is also clear that interaction with mobile devices is just one part of M-Learning; the most important part is characterizing these interactions so that they support the education process.

Choosing one definition of mobile learning from the many proposed is a challenging concept because the mobile-platform is undergoing rapid transformations with new technologies being developed every few months. The newer versions are getting more sophisticated but the older phones are still popular. The platform is not limited to mobile-phones, as the name suggests, but includes a host of other devices including notebook computers, digital cameras, music players, and even gaming consoles. However, unlike the E-learning platform, the m-Learning platform is device-dependent and is restricted to the use of devices with mobility features. El-Hussein and Cronje (2010) have emphasized this aspect clearly while defining M-Learning in their paper, when they note that the devices used for M-Learning must be noticeably mobile. However, the architects of M-Learning models must not consider the process as merely the extension of E-learning using mobile devices. The focus of designing M-Learning applications must be specific to the usage of mobile technology, using all the advantages the technology offers to facilitate the process of learning. Figure 1 below shows the different ways in which M-Learning can be utilized in an education setting.

Table 5. Comparison between e-learning and m-Learning

Subject	**e-learning**	**m-Learning**
Place/Area	Classroom or integrated labs	Learning anywhere, anytime
Pedagogical change	More text and graphic based instructions	More graphics, voice and animation based instructions
	Classroom or integrated labs	Field or on the move
Instructor to student communication	Time-delayed(students need to check emails or websites)	Instant delivery of email or SMS
	Passive communication	Instant communication
	Asynchronous	Synchronous
	Scheduled	Spontaneous
Student to student communication	Face-to-Face	Flexible
	Audio-teleconference common	Audio-and video teleconference possible
	e-mail to e-mail	24/7 instantaneous messaging
	Private location	No geographic boundaries
	Travel time to reach to internet site	No travel time with wireless internet connectivity
	Dedicated time for group meetings	Flexible timings on 24/7 basis
	Poor communication due to group consciousness	Rich communication due to one-to-one communication, reduced inhibitions
Feedback to students	Asynchronous and at times delayed	Both synchronous and asynchronous
	Mass/standardized instruction	Customized instruction
	Benchmark-based grading	Performance and improvement-based grading
	Simulations & Lab-based experiments	Real-life cases and on-the site experiments
	Paper based	Less paper, less printing, lower cost
Assignments and Tests	In-class or on computer	Any location
	Dedicated time	24/7 Instantaneous
	Restricted amount of time	Any amount of time possible
	Usually delayed feedback	Instant feedback possible
Presentations, Exams and Assignments	Theoretical and text based	Practical oriented exams, direct-on site, hands-on based
	Observation and monitoring in lab	Observation in the field and monitoring from remote location
	Class-based presentations	1-to-1 communication with much richer communication
	Instructor's time used to deliver lectures	Instructor's time used to offer individualized instructions and help

6. Review of Mobile Learning Initiatives

A number of mobile learning projects are conducted in the world promoted by educational institutions, companies or even by the provinces. As unique examples, the province of Ontario has made legal the use of assistive technology for students with identified special needs and the province of Alberta is developing a guide to the meaningful use of mobile technologies in schools. In addition, in Manitoba the Manitoba's Literacy with ICT across the curriculum initiative mandates that teachers develop their students' ability to think critically, creatively and ethically with information and communications technology (ICT), including mobile devices (Fritschi and Wolf, 2012). In Wilfrid Laurier University, the success of Bring Your Own Device (BYOD) pilot project conducted for the MBA program has led the university to incorporate mobile technology into its current full-time MBA program. During the pilot students and faculty participating in the program interchanged course material, assignments, presentations etc., using their mobile devices (Johnson, et al.,2011). Close to the mobile initiatives in Ontario, a research project conducted by Rhonda McEwen at the University of Toronto examined whether devices likei Pads could facilitate communication and interaction for autistic children (Hewitt, 2011). Even though mobile learning projects are gaining popularity in Canada, a number of roadblocks are slowing down their adoption. The Alibene Christian University (ACU) mobile-learning initiative is built upon the theory that humans learn best when they are in community – collaborating with others in a learning environment without boundaries. A technological solution that aims at increased learning must enhance communication and convergence. ACU seeks to connect learners through engaged, collaborative, distributive, integrated and evaluative models, all of which combine to produce a profoundly connected learning experience. MoLeNET was the largest and most diverse mobile learning initiative in Europe and possibly the world. Implemented from 2007 to 2010, the program involved approximately 40,000 learners and over 7,000 staff. Over 12 million British pounds of public money were invested in MoLeNET by the UK government and 17 participating institutions, including colleges and schools (Attewell et al., 2010).The GIPSY project ran from 2002 to the end of 2003. One of its main objectives was to explore a mobile learning environment by developing two new university courses in which classroom activities were integrated with practical field work through the use of mobile devices. The Manolo project, which ran from 2004 to 2005, built on the results of the GIPSY project and focused on the integration of electronic, wireless and mobile learning. The project aimed to answer broad questions related to use of mobile technologies for education, such as which educational activities are best suited to mobile learning, how mobile learning affects the role of teachers, and what organizational and ICT infrastructures are necessary to support mobile learning (Alterra, 2011). The Mobile Learning Initiative in Anderson University (AU) is the incorporation of iPads and mobile applications to enhance teaching and learning at the university. All AU students receive an iPad that is theirs to keep. The real focus, however, is not just adding technology but creating a shift in the way professors teach and students learn. The vision for a Mobile Learning Initiative (MLI) at the College of Education at the University of Illinois at Urbana-Champaign focuses on the belief that one of the guiding principles for 21st Century learning is to provide learning opportunities for students in which they acquire the skills necessary for living and working in a society where the proliferation and role of technology is evident. The Kisan SMS portal launched by the Government of India in 2013 is acting as a tool for disseminating relevant information, giving topical and seasonal advisories and providing services through SMSs to farmers in language of the State(Agricoop, 2013).

7. Mobile Learning and Agriculture

Small farmers provide over half of the world's food supply. Helping such farmers improve their methods through innovative and efficient agriculture has long been an aim of development projects and an important part of the fight against global hunger (Banks, 2012). Mobile phones have proven transformative in allowing residents of rural India to communicate more easily and frequently with city-based family members or obtain information on market prices. Now even poor farmers can afford mobile technology. Mobile technologies will turn agriculture into more of an information business, as precision farming, geo-location data, and access to immediate market information, all become important. Consumers are also asking for more information about farming practices and the food that we eat, which can be gathered and sent via mobile devices (Woodill, 2012). Mobile phones can help farmer in making right decision at right time during the production and also enable him in gathering, analyzing and disseminating information about prices during the marketing and supply of their crop along with providing two way channels, which is useful in research as well as in better governance and education to the farmers (Dhaliwal, 2010).

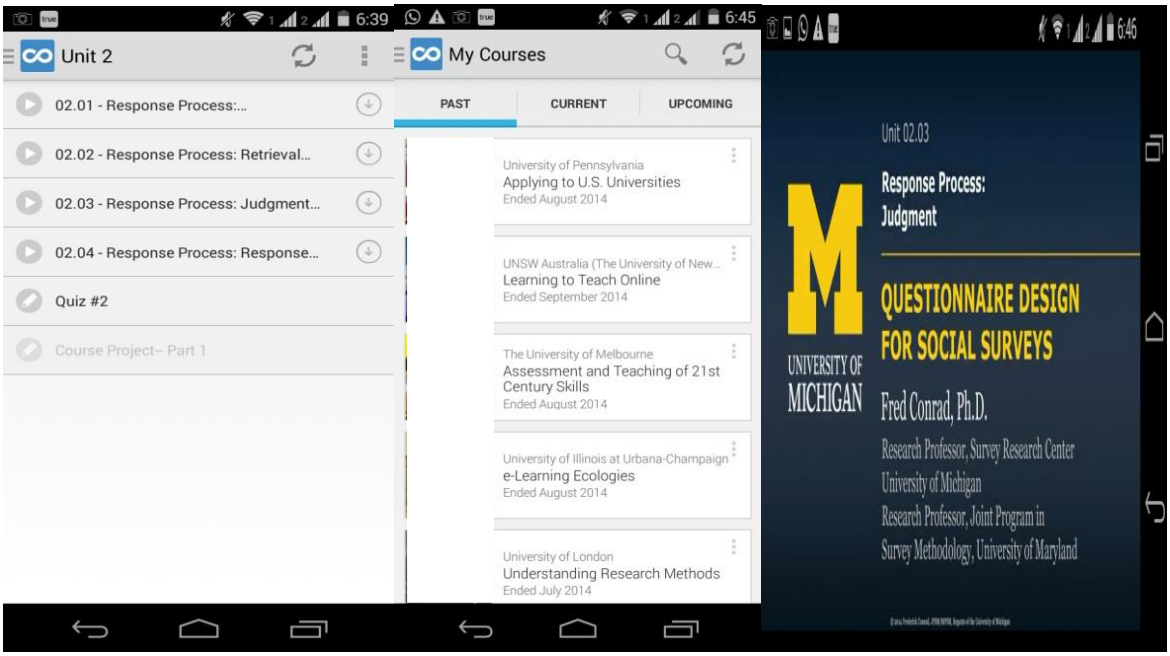

Figure1. Snapshot of courses offered through MOOC on mobile

8. Merging Mobile Learning for Agriculture and MOOC

Massive Open Online Course (MOOC) delivered through mobile learning has the potential to change the educational landscape of the country. It can include both synchronous and asynchronous elements. Synchronous elements include a series of live webinars featuring leading m-Learning researchers and practitioners, as well as periodic chat sessions. Asynchronous elements included a rich variety of background content hosted on the Learning Management System (LMS), as well as links to multimedia tools and apps that are well-suited to m-Learning integration. Participants could be given the opportunity to peruse the background information, experiment with the tools in their own professional contexts, share their experiments and reflect on how such tools could improve their m-Learning practice.

9. Challenges and Opportunities of m-Learning

Areas in relation to m-learning theory, application and development were identified from the literature review. The realistic visions for embedding mobile learning to engage learners in creative, collaborative, critical, and communicative activity, as well as the opportunities for m-learning implementation is studied critically. Some of the challenges are as follows:

1. Variability of Smartphone devices: Nielsen (2009) identified three categories of handheld mobile devices: feature phones with tiny screens and numeric keypads; smart phones that include an A-Z keypad and a mid-sized screen; and touch phones featuring a device-sized screen activated by touch. The significant challenges of m-Learning are partly due to this diversity. As Stead (2010) has explained, there is no single solution to push richly interactive mobile content onto every possible phone. Rather, there is a spectrum of possible solutions.

2. Limited Internet access and slow download speed: Despite better internet connectivity and penetration, the need of better internet services can never me undermined. M-Learning pilot projects have provided free access to the highest available level of mobile Internet access, but this approach isn't in tune with the realities facing a large proportion of users, particularly in the developing world.

3. Clumsy text input: Inputting text data into small devices presents challenges for the user. Inputting continues to be tedious and time consuming affair. More sophisticated devices provide better input capabilities but are always a costly affair.(Tsinakos, 2013).

4. Limited memory and storage capacities: Handheld phones have limited internal information storage capacity or memory making it insufficient to store high resolution videos and content. Read-only memory (ROM), which runs the device operating system, cannot usually be increased (JISC, 2010). There is a need of further researches in this direction.

5. Certification and quality control: As the market for m-Learning will increase, it will pose challenges in relation to certification and quality control for providing efficient content to the learners (Power, 2013).

6. Data privacy concerns: Data privacy has become an increasing concern since it was observed that 60% apps are sending learners information to app developers or third parties Crompton (2013). There is also the issue that teachers have to change their everyday behaviors to incorporate technologies into tasks that they previously did without digital technology.

7. Keeping pace with the changes: Olson (2009) argues that keeping pace with the rapid changes in the domain of mobile learning is one of the major challenged being posed by the mobile learning technologies. Texting was once considered as the most used function of mobile which is replaced by surfing the web in recent times.

But m-Learning also presents a unique set of opportunities as follows:

1. Continuous Learning: Education is getting increasingly interspersed with our daily activities. On our phones, tablets, and PCs, we download and digest life or work-related articles with instructions on how to fix our appliances or how to use a new professional software program. Many people across age groups decide to take formal online courses in their spare time, including complex subjects.

2. Software Literacy as a new literacy and Customized learning: m-Learning could usher in a boom of interest in learning software programming languages, which could very well become a new lingua franca. The key for successfully channeling the M-Learning revolution will not simply be about digitizing current educational systems. The real appeal will be allowing people to choose their own paths, leverage their talents, and follow their passions and callings (Sergio, 2012).

3. Relatively inexpensive m-Learning solutions: Cost remains a barrier to m-Learning in many parts of the world, handheld mobile devices and cellular services are significantly less expensive than PCs and laptops with fixed Internet service (ITU, 2010). Ramos, Trinoña and Lambert (2006) found in the Philippines that 81% of those surveyed would be willing to set aside a portion of their prepaid cell-phone credits for learning. Although cost is presently a barrier to m-Learning for some populations particularly in developing countries, the entry point for this type of learning is potentially much lower than for forms of online learning.

4. Multimedia content delivery and creation options: Smartphone devices allow sound, text, pictures, and video files to be downloaded to the device and uploaded from the device instantly. They also feature built-in speakers and, almost commonly, cameras. Ford and Leinonen used a mobile audio-wikipedia that supported increased access to information in a region "where the access to information, both paper-based and electronic, is limited" and built on "the strong African oral tradition" (Ford and Leinonen, 2009).

Conclusion

Mobile devices are an excellent source of reference information for farmers equally when encountering unfamiliar situation for better learning opportunities. Increased use of tablets and smart phones, improved broadband access for increased mobile-specific applications is extending use of digital textbooks and online instructional materials. It appears that future generations are extremely receptive to utilizing new technology and as a matter of fact, they appear to embrace the changes associated with it. With the emergence of social networking, blogging, and YouTube, farmers expect to be able to utilize mobile technology on the fly to connect anywhere and anytime of the day at their ease. Mobile learning is a hot new item that will continue to gain popularity based on convenience in the coming years. Mobile learning opens so many doors to new technology and will continue to get more complex as the years go on with the integration of different platforms of learning. It would lead to better opportunities to get customized educational solutions to expand knowledge, reasoning and analytical skills to make learning better and interesting as well.

References

1) Agricoop. (2013). Kisan SMS portal launched by Hon'ble President. Retrieved November 4, 2014 fromhttp://agricoop.nic.in/imagedefault/whatsnew/smsportal.pdf

2) Alterra. (2011). Wireless and mobile learning in the environmental sciences. Wageningen, Netherlands, WageningenUniversiteit. Retrieved October 4, 2014 from: http://www.wageningenur.nl/en/Expertise-Services/Research-Institutes/Alterra.htm

3) Attewell, J., Savil-Smith, C., Douch, R. and Parker, G. (2010). Modernizing Education and Training: Mobilizing Technology for Learning. London, Mobile Learning Network (MoLeNET). Retrieved October 20, 2014 from: http://unesdoc.unesco.org/images/0021/002161/216165E.pdf

4) Banks, K. (2012). Mobile Learning: How Smartphones Help Illiterate Farmers in Rural India. Retrieved November 4, 2014 from:

http://voices.nationalgeographic.com/2012/06/05/mobile-learning-how-smartphones-help-illiterate-farmers-in-rural-india/

5) Botha, A., Batchelor, J., Traxler, J., De Waard, I., Herselman, M. (2012). Towards a Mobile learning curriculum framework. IST-Africa 2012. Retrieved October 5, 2014 fromhttp://www.ist-africa.org/home/outbox/ISTAfrica_Paper_ref_190_doc_4866.pdf

6) Crompton, H. (2013). The benefits and challenges of mobile learning. Retrieved from https://www.academia.edu/5667064/Research_windows_The_benefits_and_challenges_of_mobile_learning

7) DeWaard, I., Koutropoulos, A., Gallagher, M., S., Abajian, S.C., Hogue, R. J., Keskin, N., Ö., Rodriguez, O. (2012). Merging MOOC and mLearning for increased learner interactions. International Journal of Mobile and Blended Learning (IJMBL), 4(4), 34-46.

8) Dhaliwal, R.K and Joshi, V. (2010). Mobile phones: Boon to Rural Social system. *Literacy Information and Computer Education Journal,* 1 (4). 261-265.

9) El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining Mobile Learning in the Higher Education Landscape. Educational Technology & Society, 13 (3), 12–21.

10) Ford, M., &Leinonen , T. (2009). MobilED—mobile tools and services platform for formal and informal learning. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education and training* (pp. 195–214). Edmonton, AB: Athabasca University Press.

11) Fritschi, J and Wolf, M. A. (2012). Turning on Mobile Learning in North America: Illustrative Initiatives and Policy Implications, by the United Nations Educational, Scientific and Cultural Organization 7, place de Fontenoy, 75352 Paris 07 SP, UNESCO 2012, France. Retrieved October 8, 2014 from: http://www.unesco.org/new/en/unesco/themes/icts/m4ed/mobile-learning-resources/unescomobile learningseries/

12) Hewitt, P. (2011). Autistic children use iPad at Toronto school to reach out and communicate. The Canadian Press. Retrieved October 28, 2014 from http://www.accessibilitynewsinternational.com/autistic-children-use-ipad-at-toronto-school-to-reach-out-and-communicate/

13) Huang, Y., Hwang, W. and Chang, K. (2010). Guest Editorial–Innovations in Designing Mobile Learning Applications. *Educational Technology & Society*, 13(3), 1–2.

14) International Telecommunications Union (ITU). (2010). Measuring the information society 2010. Geneva, Switzerland: ITU.

15) Johnson, L., Smith, R., Willis, H., Levine, A., and Haywood, K. (2011). The 2011 Horizon Report. Austin, Texas: The New Media Consortium.

16) Joint Information Systems Committee (JISC). (2010). JISC TechDis advice and guidance on m-learning. Retrieved October 20, 2014 from http://www.techdis.ac.uk/index.php?p=9_5.

17) Kukulska-Hulme and Traxler, J. (2007). Designing for Mobile and Wireless Learning. In H. Beetham, & R. Sharpe (Eds.), Rethinking Pedagogy for a Digital Age Designing and Delivering E-learning (pp. 180–192). USA: Routledge.

18) Kukulska-Hulme, A., &Traxler, J. (2005). Mobile teaching and learning. *A. Kukulska-Hulme, A. & J. Traxler (Eds.). Mobile learning: A handbook for educators and trainers*, 25-44.

19) Majumdar, M. (2009). Universal elementary education. Pursuit of equity with quality. Retrieved October 20, 2014 fromhttp://www.educationforallinindia.com/Universal-Elementary-Education-Pursuit-of-Equity-with-Quality.pdf

20) Mehdipour, Y. and Zerehkafi, H. (2013). Mobile Learning for Education: Benefits and Challenges. International Journal of Computational Engineering Research, 3 (6), 93-101.

21) Nielsen, J. (2009). Mobile usability. Retrieved October 20, 2014 fromhttp://www.useit.com/alertbox/mobile-usability.html.

22) Olson, A. (2009). Trends Presentation. Mobile Learning: Analysis. Retrieved October 20, 2014 fromhttps://www.youtube.com/watch?v=lhak-CXvr1w

23) Population projects for India and States 2001-2026. (n.d). Retrieved October 28, 2014 fromhttp://www.educationforallinindia.com/Population_Projection_Report_2006.pdf

24) Power, R. (2013). Mobilizing the MOOC: A Review of Instructional Design for Mobile Learning. Retrieved October 10, 2014 fromhttp://www.moocnewsandreviews.com/mobilizing-the-mooc-review-of-instructional-design-for-mobile-learning-idml13/#ixzz3HRqZekn5

25) Ramos, A., Trinoña, J., & Lambert, D. (2006). Viability of mobile SMS technologies for non-formal distance education. In J. Baggaley (Ed.), *Information and communication technology for social development* (pp. 69–79). Jakarta: ASEAN Foundation.

26) Rao, T.Y (2011). India's Youth Education Scenario-Need for Inclusion of Life Skills. Retrieved October 20, 2014 from:

http://www.ssrn.com/abstract=1761197

27) Sergio, F. (2012). 10 ways that mobile learning will revolutionize education. Retrieved October 20, 2014 from: http://www.fastcodesign.com/1669896/10-ways-that-mobile-learning-will-revolutionize-education

28) Stead, G. (2010). Moblearn: The mobile generation is learning. Retrieved October 20, 2014 fromhttp://moblearn.blogspot.com/2010/06/can-my-m-learning-course-runsame-on.html

29) Teall, E., Wang, M. & Callaghan, V. (2011). A Synthesis of Current Mobile Learning Guidelines and Frameworks. In Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2011 (pp. 443-451). Chesapeake, VA: AACE.

30) Toyama, K. (2011). There are no technology shortcuts to good education. Retrieved October 10, 2014 from http://edutechdebate.org/ict-in-schools/there-are-no-technology-shortcuts-to-good-education/

31) TRAI (2014). Press Release. Retrieved October 20, 2014 fromhttp://trai.gov.in/WriteReadData/WhatsNew/Documents/PR-TSD-May,%2014.pdf

32) Tsinakos, A. and Ally, M. (2013). Global Mobile Learning: Implementation and Trends. Retrieved October 10, 2014 fromhttp://www.crtvup.com.cn/ad/top_gg/image/globalMobileLearning.pdf

33) UNESCO (2002). A holistic and integrated approach to Values education for human development. Retrieved October 28, 2014 fromhttp://unesdoc.unesco.org/images/0012/001279/127914e.pdf

34) UNESCO (2012). Key Issues to Consider Mobile Learning. *UNESCO Working Paper Series*, 2012.

35) Wishart, J. and Green, D. (n.a). Identifying Emerging Issues in Mobile Learning in Higher and Further Education. Retrieved October 22, 2014 from http://www.jiscdigitalmedia.ac.uk/blog/entry/resources-for-mobile-learning

36) Woodill, G. (2012). Float's Report Shows Mobile Agriculture Has Arrived in North America. Retrieved November 4, 2014 from http://blog.floatlearning.com/Portals/241955/docs/

37) WPA (2013). World Population Ageing. Retrieved October 10, 2014 fromhttp://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2013.pdf

38) Yeh, W.T and Yang C.T. (2014). Construct a mobile device ubiquitous E-learning environment in cloud. Retrieved October 6, 2014 fromhttp://sdiwc.net/digital-library/web-admin/upload-pdf/00000995.pdf