The Emergence of Ubiquitous and Pervasive Learning Cultures

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Section 1: Digital Subcultures

> *"The world's new global cellphone culture is giving us the power to communicate with anyone, anywhere at anytime."*
>
> -Wang Jianzhou, Chairman and CEO, China Mobile Ltd.

1 Introduction

A new learning culture seems to be emerging in our universities. A culture that is increasingly more collaborative and takes place anytime and anywhere. This culture can be observed as a pervasive and ubiquitous learning culture that is being made possible through wireless communication infrastructure, which allows for this culture to emerge.

It can be observed almost universally that societies place a tremendous emphasis on the use of wireless-communication infrastructure. Irregardless of the level of development societies throughout the globe are moving toward a more mobilized, networked infrastructure. This infrastructure, coupled with the associated mobile information and communication technologies allows for many qualities of mobile communication and interaction. As a result, new forms and modalities of learning and collaboration are emerging because of this infrastruture and the ways individuals choose to use the associated tools that use this infrastructure. This emergence can be observed in the establishment of pervasive and ubiquitous learning environments and communities that harness the power of various network-enabled technologies to shape a new quality of learning that is independent of constraints of time and location. We stand at a juncture of new possibilities.

The purpose of this chapter is to explore how students are beginning to harness mobile networked enabled technologies to create a new culture of learning and collaboration. This new culture of learning and collaboration can be understood as a ubiquitous and pervasive learning culture in which anyone can engage in a form of learning that takes place anytime, anywhere.

1.1 A new culture of learning

It is 07:00am, Walanda is waking from her slumber and begins to prepare herself for a busy day at her University. While performing her daily morning routine Walanda glances at the display of her Internet enabled multimedia-device (mobile) to see if there are any changes to her academic schedule that day and to see whether there are any messages or updates for the courses she is taking. As Walanda walks into her kitchen to prepare a cup of tea for breakfast she receives a message from one of her classmates inviting her to meet at a local café so that they could (physically) meet to discuss a seminar paper that is due today. Walanda responds to her classmate (through a voice-texting service) that she cannot meet that morning, but offers her the possibility to read the revisions of their paper on her way to campus. Her classmate sends a revised version of their seminar paper to Walanda's mobile, and it is simultaneously printed-out on Walanda's networked enabled printer. Walanda finishes her breakfast and grabs the printout of her paper and makes her way to her University campus.

On Walanda's commute she reads the seminar paper she is working on with her colleague and comes across some concepts she is not completely familiar with and consults some academic resources on the Internet through her mobile. Upon arrival to campus she glances at her mobile and informs herself as to whereabouts of her colleague on a map that indicates the presence and global positioning of her friend. She knows that her friend is waiting for her in the Main Library and proceeds there to meet-up and finish their paper.

As Walanda and her friend busily work on their paper on a student terminal at the library they both realize that they will be late for one of their morning lectures they are required to attend. They save their work and send a back-up copy of their paper to a student server on the network for later retrieval if needed. While they make their way across campus to their lecture they connect to the live audio stream of the lecture and listen in over their wireless-headsets. When they enter the lecture hall their attendence (physical presence) and apparent lateness is automatically logged into the Lecturers attendance logbook. While taking their seats they receive the lecture notes and presentation slides via Bluetooth for their personal reference. While half-listening to the lecture Walanda and her colleague continue to work on their paper on their mobiles, because they know they will be able to review the lecture again at a later time on video or audio-cast.

1.2 Summary of a new culture of learning

The scenario illustrated above demonstrates the application of exisiting mobile services and technologies to create a form of blended-technology enhanced learning. Walanda and her friend tapped into networks through their mobiles to coordinate meetings with each other, acquire learning resources, stream-audio lectures, and generally engaged in what can be referred to as a flexible learning environment. As we observed in the scenario illustrated above, Walanda and her colleague harnessed mobile technologies to allow themselves to accomplish their academic obligations and learning requirements. They used the tools available to them to work within their exisiting educational system and were also helping shape a "new quality of learning" this chapter refers to as "pervasive" and "ubiquitous learning".

1.3 Overview

The adoption and utilization of mobile information and communication technologies within formalized, informal and non-formal learning contexts is fundamentally transforming the ways in which society views and engages in educational practices. It is commonly accepted that mobile information and communication technologies have tremendous potential to make an immense impact on education. This impact can be observed within the context of individual and collaborative learning practices. Students, individually and collectively, are utilizing mobile technologies to augment and enhance existing learning scenarios, but are also creating a "new quality of learning" which is born out of the use of mobile technologies and associated services. This new "quality of learning" can be observed in how students harness mobile technologies and wireless networks to create a culture of ubiquitous and pervasive learning, which can be observed on many university campuses today.

The purpose of this chapter is to briefly explore the concepts of *Ubiquitous* and *Pervasive Learning* as demonstrated in the possible learning scenario illustrated above. The central questions behind this chapter are the following:
1. What is *Ubiquitous and Pervasive Learning*?
2. Are *Ubiquitous* and *Pervasive Learning* practices feasible and will this bring a positive impact on education?

The research conducted to address these questions above is based mostly on personal observations and practice supplemented with a partial review of existing literature on topics related to the subject discussed in this chapter. It is important to stress that this chapter is exploratory in nature, and thus, will not be able to cover in depth many of the concepts and topics surveyed. It is helpful to view this work as a medium to encourage thoughtful discourse and to inspire dialogue regarding how the emergence of ubiquitous computing practices are impacting individual and collaborative learning and education in general.

2 Ubiquitous and Pervasive Learning

Mark Weiser's vision of ubiquitous computing has had an enormous impact on the formation of the field of *Ubiquitous Computing* (UbiComp) in which Weiser's central thesis was that while "computers for personal use have focused on the excitement of interaction...the most potentially interesting, challenging and profound change implied by the ubiquitous computing era is a focus on calm computing."(Wieser, 1993) The "calm technology" Wieser refers to is the technology that "recedes into the background of our lives" (Wieser, 1996) which, according to YvonneRogers "make our lives convenient, comfortable and informed" (2006). While following in the footsteps of Weiser's "calm computing" vision this chapter draws on Weiser's vision and attempts to define ubiquitous learning in relation to ubiquitous computing's vision to make the lives of the students' "convenient," "comfortable," and more "informed."

At present, we are beginning to see the first glimpses of ubiquitous "calm" technologies saturating our societies and therefore setting the foundation for a ubiquitous and pervasive learning culture to emerge. These first signs are manifesting itself through the presence of a mobile-internet and associated wireless infrasture (WiFi-hotspots), which have already permeated most Western societies. Users of these mobile networks find themselves checking their e-mail, logging onto web-portals from home, within their automobiles, at work, cafés, airports, train-stations on ski lifts and within washrooms. This new trend of using the Internet anytime, anywhere, is an emerging sign that demonstrates individual desire to stay-informed, keep in touch, be up-to-date with colleagues, friends, family and other daily activities. In doing so, individuals are inadvertently creating a culture which, when applied to learning and education, sets the foundation for ubiquitous and pervasive learning cultures to emerge.

2.1 Ubiquitous Learning

According to Weiser, "ubiquitous computing enhances computer use by making many computers available throughout the physical environment, while making them effectively invisible to the user." (1993) If such a scenario could be duplicated and applied to educational institutions a new quality of learning could (and should) emerge. This new quality of ubiquitous learning can help make the lives of students and faculty alike more convenient, comfortable, and informed by providing an "invisible" infrastructure which would support and allow for enhanced collaboration and communication. In the learning scenario described above with Walanda, we observed that ubiquitous learning can enable a more flexible way of learning and can enhance and potentially bolster individual student's ability to achieve his or her own personal learning goals. This can be done essentially by making networked enabled computers available throughout a physical environment (university campus) while, according to Weiser, "making them effectively invisible."(Wieser, 1996) By having the infrastructure in the background and invisible, it would allow individuals to go about their activities without needing to worry about the associated networked technologies. Essentially, students would be tapping into and using ubiquitous networks and related infrastructure through mobile-multimedia devices, freed from sitting behind a desktop-pc in a crowed pc-lab and engaged in more dynamic and flexible learning scenarios. The invisibility of the technology (computational

power) is one of the main characteristics of ubiquitous learning and is an enabler or what is called pervasive learning.

2.2 Pervasive Learning

When speaking about the pervasiveness of learning this refers to the aspects of learning that are more visible and tangible to the learner. The practices that the learner engages in to access learning resources, and digitized artifacts (such as: pdfs and audio/video files) to augment and supplement individualized or group learning scenarios under almost any condition. Bearing this is mind; pervasive learning gives students the ability, and more importantly the flexibility to learn "anytime", "anywhere." These anytime, anywhere characteristics can be understood as "the" main enablers of pervasive learning practices.

2.3 Summary of Ubiquitous and Pervasive Learning

In summary, ubiquitous learning can help make the lives of students and faculty more convenient, comfortable, and informed by provid an "invisible" infrastructure that would support and allow for enhanced collaboration and communication. The ubiquity of the technologies allow for pervasive learning to occur. The "anytime," "anywhere" characteristics of pervasive learning are understood as the key enablers of pervasive learning practices, and refer to the social practices involved in learning.

3 Is Ubiquitous and Pervasive Learning Feasible?

To answer the question whether ubiquitous and pervasive learning practices are feasible one must also ponder upon the question of why would anyone want to do this. Rogers asserts that: "humans are very resourceful at exploiting their [own] environment and [are adept at] extending their capabilities using existing strategies and tools."(Rogers, 2006) At present we are beginning to see the first glimpses of ubiquitous learning unfolding because individuals see a value in making the process of learning more "flexible" and learner-centered. According to Glotz, (2005) Keegen, (2002) Rheingold, (2002) and Alexander, (2004) students are already harnessing the power and potential of mobile information and communications technologies to augment their own personal and collaborative learning.

It can be argued that our educational systems have changed very little in relation to the changes and advances in mobile technologies and services. Individuals, (students especially) are beginning to witness the potential mobile technologies have in shaping a more flexible, dynamic environment for learning. They may not be calling the learning practices they are engaged in "ubiquitous" or "pervasive" learning. Morever, students are acutely aware of the benefits of having a more flexible and dynamic learning experience and this is beginning to make an impact on formal educational systems.

3.1 Impact on Education

As with any learning scenario involving technology there will always be disruptions to the prevailing ways and methods of accomplishing things. Educational systems, regardless of their maturity, are experiencing incredible stresses on their institutions as many societies are being called upon to equip their students (citizens) with new skills for the present and emerging knowledge economies. Many schools are constrained by budgetary limitations while experiencing a surge in student enrolment. Technology is one tool to help find creative solutions to overcome challenges and obstacles for individuals to obtain a quality education.

As to whether ubiquitous and pervasive learning practices will bring about a positive impact on education it is too early to give a definitive answer. Although, upon speculation it can be argued that ubiquitous and pervasive learning practices can theoretically be a catalyst to positive

change within educational systems and equip individuals with the capacity to pursue and complete their own personal education goals. Let us encourage this, and help further the development of this new culture of learning within our educational establishments.

4 Conclusion

The purpose of this chapter has been to briefly explore the concepts of *Ubiquitous* and *Pervasive Learning* and to try to answer whether ubiquitous and pervasive learning practices are feasible. With regards to whether ubiquitous and pervasive learning practices can make a positive impact on education it has been determined that it is too early to speculate on these developments, but there are many promising signs that ubiquitous and pervasive learning practices can and will make a tremendous contribution to bringing about positive change within educational systems and allow individuals and collaborative learning communities to achieve the desired education goals.

This new culture of learning and collaboration that we have defined as a culture of ubiquitous and pervasive learning is inevitable, although it may take time for individuals to adopt these practices. Lang reminds us of the following: "[that] the adoption of technology is a process that takes time, our social embedding of technologies lags necessarily behind their introduction. In addition, the ways in which they are adopted and the uses to which we put them are not necessarily the same as what prompted their development." (2004, p.171) Students and faculty will help shape and adopt ubiquitous and pervasive learning scenarios if they find a benefit in doing so. In the meantime, we need to reflect upon how we want to shape learning in the future. Do we want to follow the vision that ubiquitous and pervasive learning can make our lives "convenient," "comfortable," and more "informed" while learning "anytime," "anywhere?" Or, do we envision a different quality in ubiquitous and pervasive learning, which is less technologically fixated and more socially oriented. It is the wish of this author that this chapter adds to the discourse on technology enhanced education and brings to the surface crucial questions to address the future of education within ubiquitous and pervasive learning contexts.

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