An Opencast Mobile learning Framework for Enhancing Learning in Higher Education

Olutayo Boyinbode¹, Antoine Bagula¹, Dick Ngambi²

¹Department of Computer Science, University of Cape Town, South Africa
²Centre for Educational Technology, University of Cape Town, South Africa
oboyinbode@cs.uct.ac.za

Abstract

Producing e-learning contents through recording of lectures can be relatively easy and flexible to produce than through the conventional Learning Management System (LMS) due to improved technology. Recording lectures can serve as supplementary, substitutional or creative materials to a conventional traditional lecture. With the popularity and evolution of powerful mobile devices like PDAs, mobile phones, iPods and iPads, which are light and portable it is easy to integrate these devices into the mobile learning system. This paper describes the evolution of podcasts to opencast and a mobile learning opencast framework that helps postgraduate students in higher education adapt educational resources from Opencast Matter horn to their mobile devices which can be used anytime and anywhere.

Keywords: Podcasting, Opencast, Traditional Lectures, Mobile devices, Mobile Learning.

1. Introduction

Computers have advanced beyond the desktop into many parts of our everyday life. Mobile computing seeks to integrate mobile devices into our daily lives such as mobile phones, PDAs, iPods etc. Mobile Learning integrates advances from Electronic Learning and Mobile Computing. The most important and complete role of mobile computing technologies in mobile-learning is to construct a learning environment, where anyone is able to learn at anyplace and anytime.

Mobile learning environments overcome the restrictions of the traditional classroom and extend e-learning by bringing the concepts of anytime and anywhere to reality, aiming at providing learners with better learning experience in their daily learning environments. Use of devices such as mobile phones and personal digital assistants (PDAs) allow new opportunities for learners to be connected [2]. Therefore, learning content can be accessed and interaction can take place whenever learners need it, in different areas of life, regardless of space and time.

Due to social and economic situations in developing countries of Africa; most postgraduate students enrolled in higher education take on part time studies so that they can work some hours weekly to pay for their tuition and meet other needs. There is need to ensure that part time students get the same quality of education as their full time counterparts who invest their whole time to study.

These students frequently get into unplanned situations where they could learn if only the learning can move with them and adapt to their need. Examples of such students are mothers having to wait in the doctor’s waiting room for hours and students working as salesmen spending a lot of time driving from one customer to another either on train or in their own car.
There is need to provide the learners with learning support as they move from formal learning setting to informal learning setting, where there is no internet connection [16].

Incorporating adaptation of educational resources through opencast in mobile learning provides the learners with a learning environment that moves with them and is accessible anytime and anywhere and accommodating to the individual preferences and needs of learners. The rest of the paper is organised as follows: Section 2 describes podcasting, evolution of podcasting to opencast. Section 3 describes mobile learning, opencast mobile learning framework and scenarios for this framework. Section 4 concludes the paper.

2. Podcasting

Advances in Web and internet technologies have provided educators with series of educational tools to supplement the traditional teaching. E-Learning platforms i.e. LMS, CBT have been used widely to enhance learning before and after lectures [15]. Mobile learning platform tools can also enriched the e-learning platforms by allowing learners to access educational contents through Personal digital assistants (PDAs), Smart phones and other portable devices [2].

Podcasting is one of the enabling technologies for mobile learning. Podcasting derives its name from the Apple iPod media player; it has since become one of the most popular ways of delivering and retrieving information on the internet [1]. A podcast is simply a collection of digital media files (Audio and Video) distributed over the internet using Really Simple Syndication (RSS) technology [18]. After a user has subscribed to a podcast feed (i.e., a podcast), podcasts are automatically pushed to the RSS reader or aggregator (e.g. iTunes, iTuneU). Even if a learner with his portable device is disconnected from the internet for a certain period, Podcast can still be pushed to the device immediately when it reconnects. Learners can choose the most suitable time and venue to listen to or watch vodcasts. For example a learner can listen to podcasts while walking to school. Podcasting has seen significant growth in education in recent times by its ability to support mobile learning and enhancing student’s experience [12].

Podcasting unlike web based technologies like the blogs, wikis and online chat room found in e-learning platforms does not require the attention of the learner i.e. to input any information. This allows learners to watch vodcast or listen to podcast while involved in other activities i.e. walking, driving, cooking, and bathing. This special feature makes podcasting ideal for ubiquitous mobile learning [10]. Student who often carries portable devices such as smart phones or media players can utilize their spare time anywhere.

Podcasting technology automatically pushed learning materials to learners’ portable devices and they are notified of the materials uploaded from the e-learning environment [6]. Podcasts enable students to make adequate preparation before the traditional classroom lectures [11]. This has the effect of helping students to prepare before the face to face lesson and get conversant with the learning material hence overcoming pre –class anxieties.

Podcasting has also lead to higher percentage of students engaging in pre class preparation and in class participation when compared to the traditional classroom lectures [6]. Copley [1] indicated that podcasting enhanced students’ digestion of the Learning materials and had minimal negative effect on class attendance.

Evans [2] indicated that students are drawn more to the learning materials in the form of podcast than the traditional lecture notes or textbooks. Students also find podcasting to be very effective as a revision tool by reviewing the content of the podcasts [2]. Lecture contents in form of Podcast can be reviewed by students at their leisure after a lecture is conducted.
From the educational side an additional benefit of podcasting is that it ensures that educators organize their teaching materials in an orderly and logical manner [10].

Existing e-learning technologies such as email and file downloading can also provide supplementary learning materials to students; podcasting differs from these technologies in that it supports learning on the move [10]. When a student is waiting in the doctor’s waiting room where there is no internet he can still listen or watch his podcasts on his smart phone. The e-learning platform can be used to deliver more detailed learning materials such as comprehensive lecture notes or e-books when he is connected to the internet. Podcasting blended with e-learning platform and traditional face to face teaching enhances learning.

Podcasting also stimulates the students to further discover more knowledge from e-learning platform (downloading more detailed lecture notes) or from educators. Relating podcasting to learning in terms of purpose; it falls into three broad categories [3, 13]: enhancing flexibility of learning, increasing accessibility to mobile learning and enhancing student’s learning experience.

- Increased flexibility: The distribution of course materials in video, image and audio formats through podcasting has a way of providing greater flexibility to learners. Evolution of different digital technologies through numerous media has enhanced the distribution of audio and video contents over the internet. Students can subscribe to automatic downloads of new materials as it becomes available, so it can be accessed by the student in their own time and place. This availability increases the learner flexibility in accessing the learning contents.

- Increasing accessibility: The ability to access learning contents on portable devices enables learning on the go using mobile devices. Evans [2] indicated that most learners in this modern world has a busy schedule and are often forced to learn while on the bus train or car, at odd times. These schedules necessitate the need for portable devices that enable them to access the learning contents when they can spare the time.

- Enhancing Learning: The increasing use of podcast in education has the ability to positively influence the teaching and learning experiences of students [5].

Copley [1] notes that a number of universities have begun to use podcasts to deliver supplementary lecture materials for campus-based students. He further said that the most common use of podcasts in the universities is for the distribution of lecture recordings to enhance student review and revise.

2.1. From Podcast to Opencast

Opencast builds on Podcasting, technology i.e., recording and distributing lectures. The Opencast community lead by Matterhorn team has modified the requirements of podcasts through a flexible service oriented media framework [9].

The majority of institutions [20, 21,22] have a productive podcasting program already but are less efficient than they would like it to be and poorly situated to scale in response to the growing demand for lecture recordings, handling of media objects and working with a variety of tools and programs to produce and distribute content [9].

Opencast Matterhorn offers all relevant functionalities as an integrated whole; this reduces the amount of manual work needed to shepherd media objects across various sub-systems, thus increasing productivity and reliability. Matterhorn also allows for customization and ensures the benefit of “maximizing reuse” of Matterhorn services [9].
For institutions who want to easily produce audio and video webcasts and podcasts; Matterhorn significantly lowers the technical and cost barriers to entry. The Matterhorn 1.0 release is an easy-to-install, out-of-the-box system with automated workflows. Also for institutions who want to replace, expand or evolve their existing commercial or home grown systems, Matterhorn is highly configurable and services-based, so that organizations can choose to implement only the components they need, or replace default service implementations with their own to meet specific institutional needs.

2.2. Opencast Matterhorn

Opencast Matterhorn is a free, open-source platform to support the management of educational audio and video content. Institutions use Matterhorn to produce lecture recordings, manage existing video, serve designated distribution channels, and provide user interfaces to engage students with educational videos. The first release, Matterhorn 1.0, includes the following features [19, 9]:

- Administrative tools for scheduling automated recordings, manually uploading files, and managing metadata, captioning and processing functions
- Recommended capture agent hardware specifications
- Integration with recording devices in the classroom for managing automated capture
- Processing and encoding services that prepare and package the media files according to configurable specifications
- Distribution to local streaming and download servers and configuration capability for distribution to channels such as YouTube, iTunes or a campus course or learning management system
- Rich media user interface for learners to engage with content, including slide preview, content-based search and captioning

3. Mobile Learning

Mobile Learning (M-learning) also called nomadic learning has influenced and enhances the benefit of e-learning; regarding to access to personalized information and learning anywhere and anytime [8].

Many definitions of M-learning exist in literature. [4] defines mobile learning as ‘the acquisition of any knowledge and skill through using mobile technology, anywhere, anytime that results in an alteration in behavior’. Some other authors [14, 7] place more emphasis on the mobile devices and the mobility of the user. These authors viewed M-learning as occurring in informal learning settings.

Quinn’s [14] vision of M-learning stated that M-learning faced two major challenges, namely the problem of managing learning through intermittent connections and lack of cross-platform solutions to give all learners access to all materials independent of the devices they use. The latter issue is being addressed through interoperability efforts i.e. XML related technologies overcoming the heterogeneity of different mobile devices.

In solution to the second challenge, [16] describes M-learning delivery mechanism as being two extremes “pure connection” and “pure mobility” “pure connection” refers to a situation whereby the mobile device is continuously connected to the internet; “pure mobility” occurs when no connection is available, therefore, all needed learning contents
must be downloaded to the mobile device beforehand in anticipation of a period of limited or no connectivity.

Another major obstacle lies in the usability of mobile devices. Keegan [7] pointed out that most wireless devices had small screens, low resolution, slow processing and limited storage capabilities’ Most of these limitations are fading as a result of evolving new technologies.

3.1. Opencast M-learning Framework

E-Learning has so far been mostly delivered from desktops via wired and stable network connections [2]. With advances in mobile, wireless and technologies such as Mobile phones and PDAs, WI-FI, Bluetooth, GPS, 3G, Broadband; mobile learning has emerged. Mobile learning promotes a pedagogical shift from a formal, classroom-based and teacher centred approach towards an informal, constructivist, collaborative and learner-centred approach where learning can happen anytime and anywhere [16]. However mobile learning heavily requires the availability of tools and technologies to support the development, distribution of learning resources and services to learners on the go, taking into account device limitations. The emergent of technologies such as opencast, fulfils such a requirement, and allow novel mobile-exclusive learning applications to emerge. Opencast assist in scaling up; when there are a large number of lecture recordings, Opencast stores the information in a server where it can be distributed to any media this is very cumbersome in podcasting.

Postgraduate students in higher education take on part time studies so that they can work some hours weekly to pay for their tuition and meet other needs. These students frequently get into unplanned situations where they could learn if only the learning can move with them and adapt to their need.

Examples of such student are mothers having to wait in the doctor’s waiting room for hours and students working as salesmen spending a lot of time driving from one customer to another either on train or in their own car. These students should be able to make use of this time for quality learning. Opencast M-learning (OMLS) comes handy in helping these students out. The architecture depicted in figure 1 show how opencast Mobile learning enhances student learning. Based on [5,16,17,19];Table 1 highlights the advantages of opencast mobile learning over the traditional fixed learning, Table 2 also highlight the advantages of Opencast for mobile learning.

![Architecture of Opencast Mobile Learning System (OMLS)](image-url)
Table 1: Advantages of Opencast Mobile Learning over Traditional fixed learning

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<thead>
<tr>
<th></th>
<th>Traditional Fixed Learning</th>
<th>Opencast Mobile Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>fixed</td>
<td>anywhere</td>
</tr>
<tr>
<td>Time</td>
<td>fixed</td>
<td>anytime</td>
</tr>
<tr>
<td>Space</td>
<td>restricted</td>
<td>unrestricted</td>
</tr>
</tbody>
</table>

Table 2: Benefits of opencast mobile learning

<table>
<thead>
<tr>
<th>Opencast Features</th>
<th>Context Awareness</th>
<th>Social collaboration</th>
<th>Mobility</th>
<th>Ubiquity</th>
<th>Adaptivity</th>
<th>Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Cost Effective</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Enhance Learning</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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3.2. Different Scenarios for Opencast Mobile Learning Framework

A pilot study of Opencast begun in the University of Cape Town (UCT), South Africa in 2010. Figure 2 and 3 show a lecture capture at UCT using the Opencast Matterhorn. The case study of this work will be based on both regular students and part time postgraduate students of Health Sciences Faculty in UCT where the pilot study has already started. UCT has existing infrastructures for student to learn in the laboratory, library, classrooms, seminar rooms etc. UCT have desktops, laptops installed in different rooms and Wifi hot spots.

These existing infrastructures help students to learn when they are within the UCT Campus (formal learning setting). Students get access free of charge to internet connection within the UCT environment through wired LAN or Wifi connection. When they move away from the campus they are disconnected from these services. Internet access off campus is very expensive; so students download lecture recordings through Opencast Matterhorn on their mobile devices when on campus and use them when they are offline [16].

Below are listed different scenarios for UCT students.

- James is 3rd year student at UCT. He was ill and admitted to the hospital for three days. He certainly missed three days of lectures. He was able to get download the lectures to his PDA through OMLS on getting back to school.
- Susan is a UCT student that has lost her right hand during an accident so she could not dot down notes during lectures. She was able to review the lectures afterward with OMLS
- Sammie a UCT student is a slow learner, he cannot copy note and listen to lectures the same time. During the class he listens and later make notes using the OMLS
- Bankie missed part of his lectures due to long queue at the bus stop. He later uses the OMLS to listen to the missed lecture.
- Longiwe lives far away at Parrow she comes to UCT everyday on train. She uses the video and text module on OMLS to review her lectures on the train
- Herbert walks 30 minutes from his home to UCT everyday, He uses the audio module on the OMLS to review his lectures as he walks to school every day.

4. Conclusion

With the rapid advances in internet technologies, an array of emerging educational support tools is now available to educational practitioners to help improve teaching and learning effectiveness. Opencast can be combined with m-Learning, e-learning and traditional face-to-face classroom method to form an enhanced learning environment for students in higher education. This enhanced form of learning is depicted in our proposed Opencast M-learning framework (OMLS).

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Authors

Olutayo Boyinbode is a PhD Student at the Department of Computer Science, University of Cape Town, South Africa. Her research interests are Mobile learning, Adaptive learning and Sensor Networks

Dr Antoine Bagula is a Senior Lecturer at the Department of Computer Science, University of Cape Town, South Africa

Dr Dick Ngambi is an Associate Professor at the Centre for Educational Technology, University of Cape Town, South Africa