

# THE USE OF WEB-RADIO IN MOBILE LEARNING

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The diffusion of modern mobile devices and applications coupled with the pervasive use of social network services and communications tools, are dramatically changing the way people work, live and learn. In this perspective, this work will discuss an innovative proposal, to be considered as a new paradigm in mobile learning. In particular, we present the use of a Web-radio channel as an educational tool in a mobile-learning environment. Such a medium has unique characteristics of an interactive tool and, furthermore, interaction among users can be enabled by the integration with social networking. Therefore, given the special characteristics of such a *medium*, it is quite natural to design educational activities relying on social networking, which can be implemented in a mobile environment, according to a novel Web-radio social networking mobile education model.

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## 1 Introduction

Nowadays, there are a huge number of mobile applications for a variety of services. This is due to both recent advancements in Information and Communications Technology (ICT) and to the ever-growing availability of smartphones and mobile devices offering Internet connection capabilities at affordable prices. Moreover, users have modified their attitude and habits in the way they interact online, thus they are playing an active role in this change, also driven by the process of multimedia convergence. This reflects in many people using their appliances all day long, whenever there is time, and regardless their location. In addition, a new wave of User Generated Content (UGC), which includes text and pictures, as well as audio, video and geo-localized information, overwhelmed the Web. Due to the high number of registered users and to their popularity, most popular mobile applications involve Social Network (SN) sites functionalities so that SN mobile applications are gaining a pre-eminent position in the landscape of software tools and services, even from a commercial point of view.

E-learning activities can greatly benefit from such a scenario. As an example, let us consider the novel micro-learning strategies (Coccoli *et al.*, 2011), which are powered by this set of new technologies. Besides, traditional e-learning activities based on collaboration and cooperative models, where the social aspect plays a fundamental role, can take advantage of the communication functionalities enabled by SN sites. The latter also facilitate community management and can be implemented by means of ad-hoc solutions, as well as through standard SN services. This is a commonly adopted solution and the trend for the future development of e-learning platforms (Adorni *et al.*, 2007; Caviglione, Coccoli & Gianuzzi, 2011). In this way, online collaboration is empowered, hence social constructivism models and strategies can be profitably applied. Nevertheless, sometimes this tendency is criticized, especially when it involves mainstream SN environments. This is mainly due to potential security and privacy problems (Caviglione & Coccoli, 2011) and interference with the formal relation between teacher and learner. However, the idea of “social networking” used in e-learning can be applied to specifically designed environments, which are safe and controlled and whose value is undoubted. There are also other applications and activities that can be considered examples of social networking but which do not use SN platforms and services. However, in some educational contexts the most popular platforms are already in use, exploiting, for example, Groups on Facebook and Second Life, where special “islands” are created for classes. The latter in particular is already integrated in widely adopted learning environments and e-learning platforms like Moodle (see the relevant Web site at the URL <http://sloodle.org>). What is done

with Second Life is the creation of a virtual class where a traditional lesson is implemented by using new tools. Sociality is still associated with face-to-face interaction between presents, which is facilitated in this way, even in distance learning situations. Using SN in teaching can therefore have different aspects, since most of SN environments mix different ways of communicating. In fact, users can employ both asynchronous tools like messages and synchronous ones, like chats. In particular, chatting is one of the most appreciated resources witnessed by the effort done by the main SN environments (i.e., Google+ and Facebook), which have recently introduced their new video call services with multiple users.

To sum up, successful learning activities can be implemented through mobile devices, both in formal and informal contexts of social networking, engendering the new social networking mobile learning paradigm. In this work, we will focus our attention on the specific case of using a Web-radio channel within the above paradigm, highlighting advantages and possible benefits, as well as the main technical aspects. In fact, Web-radio can be considered a SN environment since it provides content delivery and interaction at the same time. Furthermore, Web-radio has recently turned into a mobile system too, which allows it to be available to everyone at anytime, regardless his or her position.

The remainder of the paper is organized as follows. First, the role of radio in learning activity is outlined, then the main technical issues relevant Web-radio are discussed. As an outcome, it is discussed how Web-radio can profitably exploit mobile-learning methodologies. Next, a focus on the Web-radio broadcasting at the Italian university is proposed, to witness the rapid growth of this phenomenon. Conclusions close the paper.

## 2 Learning with the radio

Among the many available *mass media*, also including Internet, the radio has a preeminent position and, historically, it was the first mobile device to be introduced. In fact, radio waves reach the receiver through an antenna and the receiver has low energy demands, can be small and, hence, portable. Miniaturized versions of FM radio have been commercialized since 1954, when transistor-based models appeared. Moreover, the radio is interactive. A high level of interaction with the audience is the main characteristic of many successful programs, where the speakers read the messages sent by the listeners. In the past, the radio was also used an educational tool, especially to teach languages to illiterate people. Nowadays it is employed in developing countries with the same purpose. Recent advancements in technology, which resulted in new devices and tools, concur in innovating the traditional means of transferring knowledge and communicating ideas and information. In such a dynamic

and multimedia scenario we focus on communicating orally, which comes up again in a renewed shape, empowered by Web-radio.

### 3 Web radio

Following the development and the evolution of the Internet and the World Wide Web (WWW), the radio has turned into Web-radio and the users can listen to programs through a browser on a PC, over an Internet connection. Especially in the USA, a huge number of Internet radio stations was created, which, not only changed the way people listened to content (Premkumar, 2003), but also created a brand-new model of mass media. This evolution was favoured by the definition of the *RealAudio* format, by Rob Glaser in April 1995, which set a new standard and made it possible to deliver digital audio over the WWW. The Web-radio dramatically changed the world wide radiophonic landscape (Lee, 2005). Many Internet radio stations were created from the ground up while many others were introduced as the Web version of existing broadcasting channels. New models such as the thematic radio stations were possible and the range of topics covered by radio programs was expanded.

From a very technical point of view, a Web-radio is just a radio station, which broadcasts over the Internet rather than over the air. Voice and music are digital audio signals (Priestman, 2002) and content is delivered through a dedicated *streaming* server. As a consequence, users can listen to programs through any device provided with connection and playback capabilities (e.g., a Web browser on a standard PC, a mobile device with IEEE 802.11 connectivity), not an FM receiver. In simple words, a client (a specific software application as well as a browser plug-in) requests a connection so that a compressed data flow is sent over the Internet, according to a specific coding algorithm. Upon receipt of the above data flow, the software client performs a decoding and plays in real-time the requested content. Such a simple and effective mechanism has enabled a rapid success of Web-radio services. Moreover, owing to the availability of open-source software tools, the implementation of Web-radio services can be cheap, so that they can be launched even within low-budget projects. Likewise, based on the same principle of “openness”, many authors distribute their songs under a creative-commons licence (see the relevant Web site at the URL <http://creativecommons.org>). They are available for free and there is only the constraint of attribution to acknowledge one’s authorship. For what concerns hardware (recording studios, microphones, digital recorders, mixer and headsets, etc.) it can be purchased at a wide range of prices. The main economical effort will result in the requirement of bandwidth and connection capabilities, when the number of listeners grows. The architecture of a general Web-radio set-up is reported in Figure 1. It also shows the possibility



on cloud computing) enables a variety of educational activities. To enhance the users' experience while they are on-line, all the Web 2.0 communication tools are exploited and integrated in the lesson plan, which must take into account and encourage the possibility of multiple interactions.

In the past, according to the traditional model of "distance-learning", educational content was sent via snail-mail to the *home-learners*. Audiotapes and videotapes were frequently used to support the course. With the introduction of e-learning systems, a variety of Web-based frameworks were used with the same aim and content delivery was performed within specific platforms, which also offered communication services, supporting teaching and learning activities. At first there was only plain text or simple Web pages whereas the advancements in the creation and sharing of Learning Objects (Ip *et al.*, 2001) allowed for the introduction of new services and, more recently, the use of audio and video content as well as live and streaming lessons for remote learners, which can access the same lesson in podcast formats. From an educational point of view, the radio program can be simply regarded as a remote lesson. The standard face-to-face lesson can be improved by the interaction with listeners who can participate through various functions, setting up a real media-convergence model (Jenkins, 2004). The further evolution of e-learning was achieved through the enhancements in technology and changes in the delivery networks and the availability of high bandwidth Internet connection (which has not been fully introduced in developing countries yet). Additional modifications in learning methodologies and tools were also due to the success of Web2.0, and the *e-learning 2.0* (Downes, 2005) as a consequence.

According to this paradigm, the learning activity is no longer based on a (closed) framework. Users are the main actors, they actively participate in the learning process, communicate with each other, and interact with teachers, with whom they exchange information as well as experiences. Moreover, educational content is undergoing a change and is shaping itself as something different from the use of traditional LOs as they are defined in SCORM by ADL (see the relevant Web site at the URL <http://adlnet.org>). In fact, most of this content is multimedia and sparse over the Web. In practice, the Internet itself has to be considered as a learning platform, in which educational content is available and accessible, easy to find and whose selection is driven by the users' interaction, according to a collaborative knowledge construction model, and outside traditional e-learning platforms (Adorni, Battigelli & Coccoli, 2007). As already pointed out, in this scenario of continuous and constant evolution of communication networks, the ultimate mobile devices enable people to be always online which has a positive impact over the development of mobile-learning. Recent devices (e.g., smartphones and tablets) allow people access

the mobile phone network (e.g., through GPRS, UMTS, 3G and LTE) as well as standard IEEE 802.11 WiFi networks. Following the idea of *smart-cities*, where more and more free WiFi services will be available and citizens will be more and more *connected*, there will be more time and new spaces for online activities, both for entertainment and work. Such a novel scenario implies new methodologies and new educational strategies (Bianco, Coccoli & Vercelli, 2009) in order to exploit non-traditional education channels. Together with technology, users are changing their lifestyle and moving towards a model in which ICT is seamlessly integrated in their life and used to explore new social interaction models. As a consequence, Web-radio will reach the listeners not only in their homes and offices. It will also be available everywhere, for a new generation of mobile users.

Educational activity performed through Web-radio is meant to take advantage of the concurrent presence of remote learners and teachers during the *live* lectures. At the same time, podcasting can be used to virtually attend a pre-recorded lesson as well as for a better understanding (Moura & Carvalho, 2008) since learners can listen to podcasts, after downloading them, on portable devices (e.g., mp3 players), while moving even without the mandatory requirement of a continuous Internet connection. Podcasts are widely used in educational activities (Evans, 2008) and research has provided relevant results on it (see, e.g., Morisse *et al.*, 2009; Lonn & Teasley, 2009). Empowering podcasts with social media result in a winning strategy, because they support and encourage collaboration among users (Lee *et al.*, 2006). At the same time they enable the construction of adaptive programming schedules (Baccigalupo & Plaza, 2007) tailored to the individual needs, according to their specific attitudes and learning styles. The podcasting is a suited educational tool in blended learning strategies (Umi Hanim, Mazlan & Halimatolhanin, 2009) too.

Summarizing, radio-learning is considered a challenge for Web-radio (Teixeira & Silva, 2009), especially in the field of University broadcasting. Moreover, the adoption of podcast-based methodologies integrated with social networking activities allows for a rethinking of the collaboration-based educational models. Audio-lessons can be enhanced with text and video as well as with activities including interactive collaborative tasks and communication.

## 5 Web radio at the Italian university

To witness the growing interest for this new trend, a short review of the Web-radio projects managed by some Italian Universities is presented, for which data were available to the Author. The number of Internet radio stations launched in educational institutions is rising fast. After a preliminary analysis, one can find that there are many more active projects than expected, managed

by single Universities, and coordinated by different research groups working together, especially from the areas of technology and human sciences. The first Italian Internet radio station was launched in Verona, in 2002. Its name is *Fuori Aula* (namely, “outside the classroom”) *Network*. Then, in 2006 a survey was carried out, which showed an impressive growth rate. In fact, 20 new University Web-radio stations were found. At the moment, 41 projects are active, as shown in Figure 2. Moreover, University Internet radio stations joined a common network, RadUni (see the relevant Web site at the URL <http://raduni.org>), so as to share content and information of common interest and communicate research results outside the traditional channels. Another aggregation site is Ustation (see the relevant Web site at the URL <http://ustation.it>), which is based on the syndication mechanism, and which acts as a collector of news from the academic world. Examples are interview with experts, visiting researchers, students and politicians involved in the academic regulation. One can observe a similar situation even in countries abroad, where associations group College/Campus/University Internet radio stations.



Fig. 2 - University radio broadcasting in Italy.

Among these, *campuswave* (see the relevant Web site at the URL <http://campuswave.it>) is the Web-radio created and managed by the *Communication Sciences* students at the University of Genoa, Italy, which is sited at the University Campus in Savona, a town just 40 km away from Genoa. *Campuswave* was born in 2010 in collaboration with engineering researchers in order to deal with the technology-related aspects of the projects (e.g., streaming server, Web server, connectivity, software solutions, etc.). The *campuswave* project is still active and it can be considered much more than a recording studio: it can be



regarded as a multimedia research laboratory, in which novel communication methodologies and technologies are experimented and tested and new educational programs are designed, produced, and delivered. The creation of the campuswave radio channel was a very interesting educational experience in itself, especially for the students who took part in it, as they were requested to perform non-standard activities and successfully apply the learn-by-doing paradigm. This is what happens today, for example when they are asked to create new formats or to advertise existing programs or events. The campuswave group also broadcasts news about the daily life at the Savona Campus and the University of Genoa at large. Participating in the creation of a radio program also entails good speaking and writing skills as well as a deep knowledge of social media strategies and Web advertising techniques.

## Conclusions

The radio is becoming different and people's attitudes are changing. The Web-radio has introduced new ways of approaching content and has contributed to spreading new models of learning, also in mobility. The diffuse use of SN services (eg., Twitter and Facebook) and relevant instant messaging systems is modifying the way listeners interact with speakers. The use of this medium as a learning tool in social networking mobile-learning environments can lead to the following results: i) due to lower costs, a huge number of channels can exist concurrently, each one dedicated to a specific topic or even to a given university class; ii) podcasting allows users to download audio recording so that they can be played and listened to at any time, on a variety of portable devices; iii) play-back devices can be even very simple and, hence, cheap; iv) content can be made accessible on the Web-site the radio is broadcasting from; v) interaction through social networking services can increase communication, collaboration and, finally, the effectiveness of learning.

To conclude, the use of an Internet radio station for mobile-learning can provide educational strategies with a new power tool based on communication, cooperation, collaboration and sharing. This is leading to the growth of ubiquitous learning and informal learning models and, therefore, can further strengthen such approaches by generating the new paradigm of Web-radio social networking mobile education.

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