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Towards Guidelines on Educational Podcasting Quality: Problems Arising from a Real World Experience

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Abstract. This paper presents an experience of educational podcasting set up at the University of Bergamo (Italy), and derives from that experience some remarks upon the quality of podcasting services, in order to promote the definition of guidelines on podcasting quality. We discuss three main attributes of a podcasting environment: quality of the production environment (recording and editing), quality of the product (content and communication style), quality of the distribution environment (paratext and management).

Keywords: podcast, educational podcasting, quality of podcasting, distance education, distance learning, mobile learning, collaborative learning, computer science education, experimentation, open source, freeware/shareware.

1 Introduction

This paper presents an experience of educational podcasting set up at the university of Bergamo (Italy), and derives from that experience some remarks upon the quality of the podcasting services, in order to promote the definition of guidelines on podcasting quality.

A short description of our experience shall allow us to introduce some of the most critical issues that should be taken into account by podcasters.

Our podcasting service (Pluriversiradio, http://www.pluriversiradio.it), was implemented by developing Podcast Generator, an open source library for building and managing podcasting services. Besides the University of Bergamo, our software library is currently used by at least five hundred podcasting services in Italy and abroad.

Pluriversiradio has been used during the second semester of the academic year 2005-2006 for courses on multimedia communication and human computer interaction at the University of Bergamo; after that first experiments, other colleagues began recording podcasts for their students.

The development and management of an educational podcasting service led us to face the problem of the quality of the podcasts and of the service itself. On the ground of our experience we try to highlight some guidelines that could be used for developing quality models for (educational) podcasting services.

2 The use of podcasting in education

The increasing popularity of mobile media players has made podcasting an interesting and attractive way for distributing educational materials: the use of podcasting is spreading throughout the education sector and several universities have set up podcasting services (among the first ones Michigan, Duke, and Stanford), but the literature is still poor of examples, case studies and evaluations [11, 16, 20].

Nevertheless, despite the current lack of quantitative data about the effects of podcasting on education, many educators consider podcasting as an exciting learning paradigm of impressive pedagogical potential [2, 4, 7]: limited technical skills and efforts are enough to produce materials, such as course lectures, interviews, workshops reports, which can be used to meet individual's learning or teaching needs [10, 17]; students can be involved in producing, editing and delivering podcasts by themselves as a part of their assignments, developing in such a way collaborative and social networking activities and stimulating more effective learning processes [3, 5, 8, 9, 13]. Moreover, learning through listening is greatly appreciated by those students whose learning style is mainly auditory ([14]), while visual learners benefit from seeing videos from which they can catch teacher's expressions and body language.

On the ground of these positive feelings, we started in 2005 a project aimed at developing a podcasting service to integrate the elearning facilities of the University of Bergamo.

Since 1999 the University of Bergamo has enabled its students to access learning facilities through several elearning services: an elearning platform for asynchronous activities, tools for synchronous lessons, web procedures for distributing materials and managing all the bureaucratic aspects of the academic life.

Such efforts are appreciated by the students for two main reasons:

1. first of all, as rather usual in Italy, there is a high number of part-time students, who are very keen on any distance learning facility, which enables them not to commute to the university. Moreover, students declare to appreciate the availability of online tests and assignments, the ability to interact with lecturers, tutors and other students via online discussion facilities and to actively participate by posting questions and replying to discussion threads, as well as reading or downloading files [12].
2. on the other hand, the number of the students enrolled at the University of Bergamo doubled over the last five years, and this enormous increase induced some structural problems, which could be more easily faced by means of the elearning services: for instance, the Linguistic Laboratory has been virtually extended by developing on the elearning platform a large set of lessons incorporating the digital version of the audio and video materials already available at the laboratory (several hundreds of lessons for 24 different courses on English, French, German, Russian and Spanish, as well as Italian for foreign students, are currently available on the elearning site of the Faculty of Foreign Languages and Literatures).

As a natural evolution of our work on audio files, we decided to try the podcasting as an educational tool. Therefore, we started a project with the aim of developing an open source, free and sharable software library to manage a podcasting service, which could be freely downloaded and easily installed by other potential podcasters; and the release of an open podcasting environment, freely accessible by any Internet user.

As a result, in 2005 we designed and implemented Podcast Generator (PG), an open source library for building and managing podcasting services (http://podcastgen.sourceforge.net); using PG we built Pluriversiradio, a podcasting service freely accessible via web (http://www.pluriversiradio.it) or through a feed aggregator (http://www.pluriversiradio.it/feed.xml).

3 Podcast Generator and Pluriversiradio

Podcast Generator (PG) is a free PHP script released under GPL, that lets users upload media files via a web form and automatically creates rss 2.0 w3c-compliant podcast feeds, which are fully compatible with Juice and iTunes. Moreover, Podcast Generator acts as a content management system, able to manage a web site that hosts one or more podcast channels: when we say podcast channels we mean thematic subsets of the documents of a podcasting service, that is, for instance, all the recordings on a specific subject, or related to a single course.

Podcast Generator comprises three main modules:

1. a database to store multimedia files and the catalog of such recordings;
2. a procedure for loading podcasts into the database;
3. a CMS (Content Management System) for the management of a web site for the distribution of the multimedia materials (our recordings can be downloaded either through podcast catchers or via web).

Since the first beta release of PG, the database has been available in csv version, to be easily installed on any web platform, and subsequently developed in MySql; it can hold and host 21 different multimedia formats and manage for each file a record with several fields: title, author, short description (text), long description (text), image, categories, iTunes keywords, metadescriptions (based on the Dublin Core Metadata Element Set) to facilitate future "intelligent" search agents.

The loader provides a user friendly form to load the audio / video podcast and all the data which describe it. The loader validates all these data, loads them into the database, loads the podcast into the multimedia archive, and updates the RSS feed of the podcasting service.

The CMS module manages a dynamic web site that allows web surfers to access all the podcasts, either searching through the whole set of podcasts or by looking at the subsets based on the categories declared at loading time.

Using the first beta release of PG, in March 2006 we created Pluriversiradio, a web site to collect podcasts and to provide web surfers with the proper feeds for getting files from their podcast aggregators. This content of this site is strictly related to courses, seminars and conferences held at the University of Bergamo.

Despite born as a small size experimental project, Pluriversiradio was subsequently hosted by the Interdepartmental Center for elearning of our university; besides the University of Bergamo, our software library is currently used by at least 500 podcasting services in Italy and abroad (for instance, the university of Pisa and Bari in Italy, of Delaware in the U.S.A., of Aarhus in Denmark).

The quick diffusion of PG is due to its efficiency, ease of use and installation: the open source nature of the program allowed the cooperation of a set of kind users, who translated the installation procedure, originally written in English and Italian, into Chinese, Dutch, French, Japanese, and Portuguese; it will be soon available in Catalan, Danish, Galician, and Spanish. Moreover, the Dutch foundation Kennisnet Ict op School used PG for publishing a screencast series about podcasting with open source and promoted the use of PG in schools: for this purpose they have also developed a video podcast the explain the installation procedure of PG (http://files.ictopschool.net/podos/mp4/09.mp4).

Pluriversiradio has been used during the second semester of the academic year 2005-2006 for two undergraduate courses on multimedia communication and human computer interaction at the Faculty of Arts and Philosophy (currently Faculty of Educational Sciences) of the University of Bergamo; after that first experiment, other colleagues began recording podcasts for their students, whilst some lessons from Pluriversiradio have been used by colleagues of other universities (for instance, the university of Verona) or stored into their open archives (for instance, university of Perugia): this is possible because our

recordings are freely accessible and distributed under a Creative Commons By-Nc-Nd license.

The second of the multimedia communication courses which used Pluriversiradio (Laboratory of multimedia communication) aimed at introducing students to the foundations of the human computer interaction, to basic elements of graphic interfaces and to the management of audio files and the use of podcasting.

Podcasting was used first of all by the lecturer for recording syntheses of the theoretical lessons and for distributing them to the students. As soon as the students became rather skilled with audio files management (using the free software Audacity for recording and editing sounds), we started an experiment with the full time students (eighteen students were involved): each of them had to create his/her own podcasts. The experiment was based on three assignments: two re-elaborations of pre-existing interviews and the development of a lesson about one of the themes of the theoretical course not yet dealt by the lecturer. For this third task students were given some constraints (duration, sampling rate, bit rate), but were free to choose their favorite format: some of them arranged a formal lesson, others (a group of three students) simulated a moderated debate, others a desperate phone call between friends the night before the exam. (more details on the experiment and its evaluation are provided in [15]).

In order to understand whether the use of podcasting affected learning, we exploited exam results for evaluating student performance, by comparing exam grades over the past three academic years, using overall grade average. The goal was to determine first of all if there were significant differences in student performance this year, and subsequently if there were significant differences between the students involved in the experimentation and the other ones.

At first sight we found that the results of the current year were better than the previous ones. Nevertheless, after a first round of data processing [1], we demonstrated that this increase is not necessarily explained by the innovation of the podcasting.

Therefore, we separated the grades of full time students, who took part to the experiment, and part time students: these figures showed that full time students usually perform better than part time ones, but also that whilst the latter provided this year results similar to those of the past years, the former have seen a considerable increase. In this case data processing confirmed that there is a statistically significant increase of the average grades.

These results seem to support two conflicting ideas:

1. the grades of the part time students say that the use of podcasting for distributing course materials did not affect the results: this might be interpreted as a failure of the podcasting itself, or simply suggest that part time students ignored those integrative documents;
2. on the other hand, the grades of the full time students suggest that their involvement in creating podcasted lessons enhanced their learning experience in a very effective manner; by figures and observation we can say that podcasting design, recording, and editing spurred the development of reflective learning skills, stimulated students to go deep into the questions they had to face, fostered collaborative behaviors. Similar considerations arose from the analysis of the student satisfaction surveys, which are part of the institutional audit process of the University of Bergamo, and from the qualitative analysis, based on the grounded theory [18], which was conducted on transcriptions of colloquia with students and on their open answers to the student satisfaction questionnaire. The results emphasize the impact of the creative use of podcasting on the perceived quality of the course, but also on the ability of the students to assess their own understanding of the topics of the course and to deepen their competence beyond the walls of the classroom.

4 The quality of podcasting

The development and management of an educational podcasting service led us to face the problem of the quality of the podcasts and of the service itself. Unfortunately, the literature provides little help on the subject: web pages, scholarly papers and books about podcasting quality are very few and they are mainly concerned with recommendations about the quality of the audio (or video) files and the relevance of the bandwidth [6], but a really applicable quality model does not exist.

We do believe that a quality model for podcasting services should address multiple issues and we wish also to underline that the aforementioned requirements, even if they are in some way "user-centered", are rather general and do not take into account that different podcasts could have different audiences.

Therefore, the aim of this paper is to foster a discussion about the quality of the podcasting services: we are far to define our own quality model for podcasters, but on the ground of our experience we try to highlight some guidelines that could be used for developing quality models for (educational) podcasting services.

Our proposal is based on our experience of podcasters, on a survey of podcasting services over the Internet, on discussions with colleagues and other podcasters, on interviews and colloquia with our students aimed to understand the current use of the service to get a clear picture of users' needs, and also on feedbacks that we have got from Internet surfers, who visited our site and downloaded our podcasts directly from the site or by subscribing to the podcast service (we logged some thousands downloads for each of our podcasts).

We believe that the first step towards the development of a podcast of quality should be done by identifying three main components [19]: primary users, primary tasks, context of use. Therefore, we have to answer to some fundamentals questions: who are the main users and which are their characteristics? What are their main tasks? What is their computing / reproducing environment? Note that the context is not only defined by the technical facilities, but also by the fruition modality: listening to a podcast at home through the PC is different than listening to it via a mobile device while commuting from home to the university. Moreover, listening to an entertainment podcast is rather different than listening to an educational one.

With reference to the fundamental question about users, in our experience we have to consider that our typical audience is mainly composed by students belonging to three different categories:

1. central users: students who regularly attend the lessons and use the podcasting as a source of summaries or deepening;
2. proximal users: students who sporadically attend the lessons, and therefore exploit the podcasts for integrating their knowledge;
3. distal users: students who rarely attend the lessons, who exploit the podcasts as a source of distance learning.

Each category could benefit from different types of podcasts from the point of view of the contents and their organization. Therefore, metrics for evaluating the quality of an educational podcasting should be weighted on the main final user of the service.

Moreover, the academic environment suggests different ways to manage the podcasting, that can be used for recording lectures, but also workshops, conferences, discussions, interviews, and also for training students, who can produce podcasts by themselves as a part of their assignments. With reference to the lectures, some colleagues interviewed on this topic said that they prefer to record the whole classroom lesson, while others do not like such intrusive way to record their talks and prefer to set up syntheses of the lessons, which can be more effective and less annoying for the listeners.

On the ground of such experience we wish to address the attention to some attributes that should be taken into account for developing high quality podcasting services - we have

identified three main attributes, each of them has two main subcategories, each subcategory has its own attributes that should be taken into account:

1. Quality of the production environment: recording and editing.
2. Quality of the product: content and communication style.
3. Quality of the distribution environment: paratext and management.

For the sake of simplicity, in the following we shall deal with audio podcasts, but the same guidelines could be considered as a starting point for video podcasts as well.

With reference to the quality of the production environment, web sites on podcasting are rich of suggestions about the quality of recording, based on the type of microphones, recording environments, set-up phase, sampling rate and bit rate. A quality model for podcasting environments should provide a metric to evaluate all of these attributes, but we do believe that they should be weighted according to the type of podcasting service: whilst high sampling rate and bit rate, for instance, are very important for an entertainment podcasting that broadcasts music, the relevance of these attributes for educational podcasting, according to our experience, to literature and to colleagues, is rather low and this type of podcasting does not require very effective devices (we use 32kbps and 11,025/22,050 kHz).

When we say "quality of recording" we address the activities required to produce the file to be podcasted, that is filtering and mixing voices and choosing the proper file formats and compression levels. For our experiment we simply used mp3 files, but discovered after the first lectures that a musical background is considered by students an agreeable way to fill gaps between sentences or parts of the lesson.

The quality of the product is, of course, a key attribute: the content is required to be complete, credible, sound; relevance, coherence, completeness, length (time: we usually limit our recordings to 15 minutes), dimension (memory) are the attributes to be evaluated.

But podcasters must take into account the importance of the quality of the communication style: format, style, enunciation, evidence are the keywords to be considered. Educators must remember, as stated above, that the choice of the right format of the podcast is not optional: complete lectures can be perfect for distance learners, but could be rather annoying; nevertheless, they can be a good chance to catch extemporaneous speech that could happen to arise during the lecture. The podcasts produced by our student show that a non-academic format can be useful as well; and that the involvement of students in producing podcasts can be a way to improve learning processes.

With reference to the quality of the distribution environment, we do believe that podcasters should avoid delivering all their materials to each user independently by user's needs. Unfortunately, a survey of some dozens of professional podcasters showed that this is not the case on the majority of them: even pioneer podcasting services on iTunes U provide many different thematic feeds, but they appear too general (Faculty lectures: audio; Faculty lectures: video) to be really user centered.

We suggest that a podcasting service should at least provide multiple feeds for multiple channels. This is part of the attention that should be paid to the paratext, together with the compliancy with *de iure* or *de facto* standards (w3c, iTunes, Juice), and the meta-tagging for allowing current or future search engines to properly index the podcasts. At the present time we are working to design and develop an ontology of podcast objects, in order to allow enriching each podcast with meta-descriptions or tags suitable to be shared with software agents that could extend the poor access facilities currently provided by the aggregators; each podcast could be properly described and therefore would be suitable to be matched by communication agents instructed on the ground of detailed user's requirements. This would require more sophisticated agents than common feed aggregators, such as plugins of the current media players, able to build playlists (for instance all the podcasts of a specific author on a specific theme) on the ground of semantic descriptions based on shared ontologies; otherwise, this matching could be performed on the ground of preferences expressed by the user during a registration phase on the web site of the podcasting service –

this solution would be more convenient for those services which apply access restrictions or fees. Both solutions aim at reducing the number of "useless" downloads and saving bandwidth; in some sense, the imperative is that users should be able to download exactly *quod erat downloadandum*, that is *what they needed* – therefore we call this approach *quodcasting*.

Finally, the quality of the management is related to server's functionality, availability and bandwidth, time to answer, and bug fixing – in this case the management of a podcasting service does not significantly differ from that of a conventional web site. An important issue is that of the storage platform: podcasters might decide to use their own storage area or upload the podcasts to a public database; they can accept registered users only or allow anonymous users to download files; they can set up a pure podcast service accessible via feed or provide their users with a mirror web site for direct download: each of these options should be chosen according to the management politics of the podcasting service.

Conclusions

We have presented an open source software library (Podcast Generator) that we developed and used to set up an academic podcasting service (Pluriversiradio). We have presented an experience of educational podcasting that involved students of human computer interaction both as podcasting users and producers. From our experience, literature, surveys, discussions with colleagues and experts, and feedback from users we have derived some guidelines that we propose as a starting point to develop quality models for podcasting services and portals.

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