

TU Graz goes Podcast

Martin Ebner, Walther Nagler, Anna Saranti
WG Social Learning, Computer and Information Services
Graz University of Technology
martin.ebner@tugraz.at

Abstract: This paper presents the first results of the implementation of podcasting in computer supported teaching at the University of Technology of Graz. It gives an overview on the state of the art activities on this modern field of educational experience. A comparison between different didactical settings of practice on base of evaluation data is given as well as perspectives for the future usage of podcasts for higher education.

1 Introduction

“In a blog entry dated September 28, 2004, Doc Searls ... discussed podcasting in some detail and noted that a Google search on “podcasting” brought up twenty-four hits. Searls went on to predict that in another year, the same search would “pull up hundreds of thousands, or perhaps millions,” of hits.”
— Campbell, G. (2005)

Today (2007-01-24) Google offers a result over 46.8 million hits for podcasting. Even very optimistic prognoses underestimated the enormous growth of podcasting. But why is there such a boom?

The Web2.0 hype may hold the answer to this question. The buzzword “Web 2.0” and all its applications have caused a revolution concerning the way we work with the internet during the last two years. Emphasizing this argument it must be pointed out that “podcast” was chosen to be the word of the year 2005 in Great Britain (Gamböck and Pichler, 2006) and “You” was elected as Person of the Year 2006 by the Time Magazin (Grossman, 2006). Due to the fact that Web 2.0 does not describe new web technologies rather than a new and especially easier handling of the World Wide Web. The “user is the content” is often used as synonym for this trend. Considering this phrase in detail there are two very interesting facts: user and content are in the centre of all activities. This approach differs from technology driven approaches in the past. Nowadays web software becomes easier and friendlier to use so that the typical internet user can finally do what he/she has wanted to do since years: active participating. Tim Berners-Lee¹ has already suggested the so called “Read/Write Web” in 1989 which may now become reality. Needless to express that it doesn’t matter whether the content consists of video, audio or only text, the crucial factors are easy to produce and easy to publish to a large community. In this context podcasting means the distribution of prevalent audio files and nowadays often also combined with video data.

In this paper the terminology of podcasting is explained and the way the Graz University of Technology uses this methodology as well as results of practical experiences, a discussion and future steps are presented.

¹ <http://www.w3.org/History/1989/proposal.html> (last visit 2007-01-29)

2 Theory, Methods and Experimental Setting

2.1 Theory and didactical aspects

The first attempts of transmitting voice over distances had been done in 1783 in Paris by releasing a project titled “Über die Fortpflanzung des Schalls und der Stimme in Röhren”. The invention of telegraphing leads to the one of telephoning. At the same time in 1877 Thomas Edison presented his “Phonograf”; the first analogue record was born. A decade later radio-broadcasting was brought to life and enabled the transmission of audio data from one station to an undefined numbers of consumers without problems regarding to bandwidth. With the rise of internet this evolution went a step further by making Voice over IP possible. After the compact disc as a main carrier for digital music has displaced the traditional analogue record it is now being displaced by music from internet download since about ten years – from “Napster” to “iTunes”.

The term “podcast” is a mash of Apple´s mp3 player “iPod” and the word “broadcast”. A definition of “podcast” as Wikipedia sees it (2007-01-24): “A podcast is a media file that is distributed by subscription (...) over the Internet using syndication feeds, for playback on mobile devices and personal computers. Like 'radio', it can mean both the content and the method of syndication. The latter may also be termed podcasting. ... Though podcasters' web sites may also offer direct download or streaming of their content, a podcast is distinguished from other digital audio formats by its ability to be downloaded automatically, using software capable of reading feed formats such as RSS or Atom.”

RSS is an XML based data format that carries the content of a website in a strict standardization which is similar to content organization of a weblog. Therefore the breakthrough for RSS goes hand in hand with the one of weblogs in 2002 although the beginning of RSS technologies goes back to 1995 (Nagler et al., 2006). In summer 2002 Dave Winer released RSS2.0 with the enclosure tag-element which allows connecting any kind of file to a RSS feed automatically. But the beginning of (RSS-transmitted) podcasting goes back to summer 2004 when the former MTV-link man Adam Curry wanted to implement a search script that looks for mp3 files within a RSS file. At least he himself programmed a small AppleScript called “iPodder” the first software reading and downloading RSS-Enclosures. (Quelle, Jahr)

The process of podcasting starts when the sender releases a media file on a web server included in a RSS surrounding. The media file is now automatically sent to all the subscribers to this RSS surrounding. Users may subscribe to feeds using "podcatching" software (audio-video RSS aggregators or feed-reader), which periodically checks for and downloads new content automatically. Podcatching software enables the user even to copy podcasts to portable music & video players automatically only by plugging in to players to the local station. Enhanced podcasts include chapter marks the user can browse through and hyperlinks to websites. These qualities fit in didactical scenarios perfectly. There are many of possibilities why and how to use podcasts especially for the interests of higher education:

- To record live lectures
- To catch up missed lectures
- To handle big lectures better in case of room problems
- For courses of LifeLongLearning
- For short tutorials and instructions of any kind
- For short sequences of definitions and summaries
- For self-preparation of courses or practices or even excursions
- For archival purpose
- For assessment purposes – podcasts made by students as a part of the marking

It is doubtless that podcasting has risen to be an important medium within a few years. The first steps to the usage of podcast in the higher education have already been done. The Stanford University even has an own platform on iTunes for its podcasts (Ebner et al., 2007).

2.2 Methods

The most interesting thing about the definition by Wikipedia discussed above is that a podcast is exclusively distributed over syndication feeds. In the broader sense an audio file or a video file published on the internet or made be downloadable but not being distributed automatically often is also being called a “podcast”. In the following the meaning of podcast is to be seen in that second way.

Already there are several courses being podcasted at the TU Graz. The following list overviews the activities:

- Podcasts included in the LifeLongLearning program “Traffic Accident Research” of the TU Graz by recording the courses called “Mechanik 1” and “Verkehrspsychologie”
- Recording of the university course “Einführung in die strukturierte Programmierung”
- Recording of the university course „Elektrische Energiesysteme 1“
- Recording of the university course “Informatik 1”

The settings of these recordings were different due to their goals. Our main goal was to create live recordings of the lectures held during the courses, rework the record for quality aspects and offer them on the TU Graz Teach Center (TUGTC - e-Learning platform for teachers of the TU Graz, <http://tugtc.tugraz.at>) in several formats. The recordings were all screen-capturing recordings in connection with a beamer for lecture room presentation without a live shooting of the teacher. Most of the recordings were done by the use of common laptops except the course “Mechanik 1” which was captured using a tablet pc. This one has a unique position within the podcast activities at TU Graz because the lecture was held as an interactive presentation where the teacher was generating the content in real time during the lecture.

Most of the time the recordings took place during the lecture was held. Because of several reasons like sound quality aspects or failed recordings some of the recordings had to be done after the lecture.

The recordings have been taken with the Camtasia for Screen/Desktop Recording software. The two main methods supported by the Camtasia software are:

- Desktop Recording (the computer screen is recorded)
- Desktop Camtasia (recording started through a PowerPoint presentation)

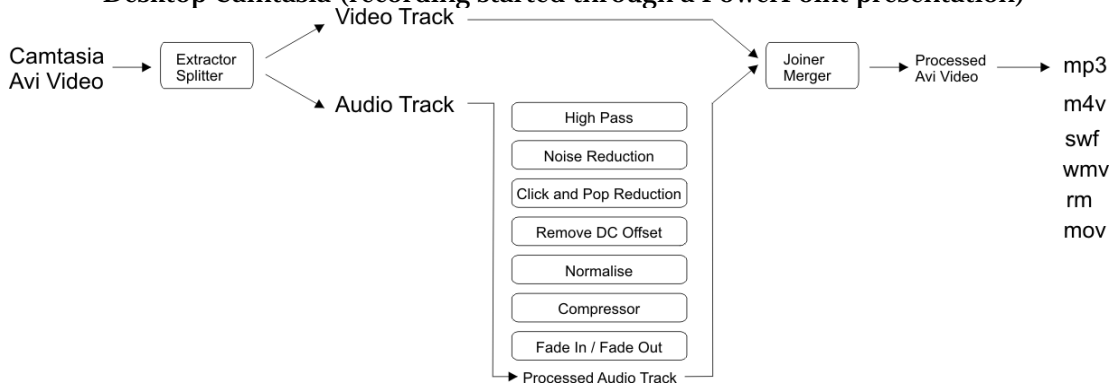


Figure 1: Reworking steps after recording

After setting all Camtasia related parameters for data recording and the microphone – a process that may not take more than approximately 5-10 minutes to achieve the best audio / video quality and at the same time to minimize the size of any generated files – the recording was done. The process of data recording by Camtasia should not interfere with the person giving the lecture and therefore a wireless microphone was used. After the recording the files were reworked in different steps by the use of several additional software (see figure 1). Given the recorded .camrec file, it was possible to produce with Camtasia an .avi container video file and an .mp3 audio file. In some cases, certain parts of a recording were not needed and were easily deleted with a video editor such as VirtualDub or AviDemux.

In case of bad recordings (because of e.g., insufficient sound check, bad positioning of microphone, no pop shield) audio tracks needed extra processing to achieve better sound quality. When the recording has static background noise and/or many “clicks” and “pops”, a noise reduction and “click” and “pop” removing process was applied. This was achieved with Gnome Wave Cleaner (GWC). The selection of the used algorithm and the respective parameters depends on the circumstances. Sometimes a “brighter” sound was desired or the elimination of low-frequency noisy parts. In such cases a high pass filter with cut off frequency of approximately 100 Hz was applied. A DC-Offset remover altered the volume / amplitude of the recording without any distortion including a normalization process afterwards. For lessening purposes – the difference between the loud and the quiet parts of a recording – level compression was achieved with a compressor. Finally, in order to smooth the audio both at the beginning (and end) of the recording, a fade-in (or fade-out) was applied.

Afterwards the processed audio track is introduced back into the video track. Video editors, such as VirtualDub or AviDemux, can facilitate this process and the resulting .avi container video has better sound quality. Given this new .avi, it was possible to create a variety of video formats, such as .wmv, .rm, .mov, .m4v, etc., with Camtasia or the Mencoder program. The latter program was mainly used for the production of iPod video file .m4v, because the video generation process took less than 10 minutes and the size of the resulting video files was smaller than the ones generated by Camtasia. Finally flash files (.swf) were produced with Camtasia because of the need for marker positioning.

2.3 Experimental Setting

The research work aimed to find out whether podcasting has a potential to enhance teaching and learning or not. Due to this fact a pre-/post-test design with questionnaires for the participants of the lecture „Elektrische Energiesysteme 1” and “Informatik 1” was used. The students of the course “Mechanik 1” were evaluated orally because of the small number of participants (11).

3 Results and Discussion

In this chapter we like to present and discuss our experiences made during our recordings as well as the results of the evaluation process. The difficulties were manifold – from the very first beginning during the recording in the lecture room to the final play on the devices of the learners.

3.1 Experiences and results

The evaluation before starting of a course was necessary to relative the evaluation after the course. The method of using a tablet pc and editing the content during the lecture hour keeps the fact that the content covers many arithmetic operations in good stead. The fact that some of the recordings had to be done a second time after the lecture may have let to a better quality but disagreed to our main aims to catch the live-character.

3.1.1 Experiences during the recording

For the purposes of the project the method of “desktop recording” (name by Camtasia) was selected. Although it produces larger files and doesn't set markers, it makes using other programs during a lecture easier for the presenter. Furthermore the use of the “Power Point started recording” method may result in data loss as lecturers tend to exit Power Point in haste or often neglect to save recorded data.

It always was essential to carry out a sound check to ensure that audio levels are between acceptable values, as too high values could lead to audio clipping. An audio check is easily done in Camtasia in the form of adjusting a parameter before the actual recording, but sometimes it is necessary to adjust the overall system volume. Besides this, in order to have less “clicks” and “pops”, it is important to use a pop shield. Furthermore the position of the microphone is crucial as it must not interfere with clothes such as scarves or be suppressed by the lecturer's neck.

However as the largest section of a video's file size represents the video track, audio encoding requires extra attention. Certain problems have been identified with the use of Camtasia. In certain cases audio and video asynchronisation has occurred. When attempting to cut parts of the stream, the resulting video has skipping frames. With Mencoder a higher level of control of the encoding process (especially for the audio) can be achieved.

3.1.2 Evaluation results

In the pre-test the status of podcasting among the students was checked. Who knows about podcasts, who listened, watched or already created podcasts or mp3 files? Which mobile end devices are used? The post-evaluation concentrated on the use and the quality of the offered podcasts. Why has it not been used? The results of the written evaluations were different. The oral evaluation results very positively. Nearly all of the students watched each podcast up to 240 minutes. Some results of the written evaluation in detail:

Research Question 1 (pre-test): I have already heard about podcasting?
(1=never, 5=sure, I know all about it)

Question	N	Mean	Standard Deviation	Median
1	94	2,23	1,24	2

Table 1: Research Question 1

Research Question 2 (pre-test): I have already heard a podcast?
(1=never, 3=heard, 5=heard and produced)

Question	N	Mean	Standard Deviation	Median
2	94	1,81	0,95	1,5

Table 2: Research Question 2

Research Question 3 (pre-test): I listen to ordinary .mp3 files ...
(1=never, 5=nearly daily)

Question	N	Mean	Standard Deviation	Median
3	94	4,15	1,27	5

Table 3: Research Question 3

Research Question 4 (pre-test): I have a mobile device?

Question	N	iPod	MP3 Player	Smart Phone	MP3 Phone	Non
4	135	15,6%	43,7%	9,6%	22,2%	8,9%

Table 4: Research Question 4

Research Question 5 (post-test): I have used the podcasts of the lecture "Informatik 1".
(1=once, 2=more than once, 3=all, 4=never)

Question	N	Once	More than once	All	Never
5	55	18%	18%	0%	64%

Table 5: Research Question 5

Research Question 6 (post-test): The quality of the podcasts was ...
(1=bad, 4=very good)

Question	N	Mean	Standard Deviation	Median
6	55	2,65	0,55	3

Table 6: Research Question 6

3.2 Discussion

The results of the first experiences towards podcasting at the TU Graz showed that it was possible to minimize technological problems occurring at the very beginning. The problems concerning the recording during the lecture as well as to the further treatment of the records especially the audio track. It is now possible to generate and distribute a podcast easily and quickly. The aspects of quick production and distribution are confronted by the quality aspect, because the voice is of major importance to the acceptance of the audience (Gamböck, Pichler 2006). The quality of the podcasts were rated good (Research Question 6) but should be improved. Only 12% of the users stated some technical problems when consuming the podcasts.

Without any doubt the driving force of the whole process is its simplicity. The learners have to concentrate on learning, on the content themselves, not on technological issues. Almonte (Almonte, Gilroy 2005) mentioned: "Podcasts are portable and re-useable, and with subscription, podcasting goes to a new level of ease and simplicity".

Though the media MP3 is very well known, podcasting is familiar only to a small group of students but no one has produced a podcast on his/her own. Lane (Lane, 2006) reported in her study that about two thirds of the students have iPods. This evaluation confirms the result of Lane insofar more than 90% of the students have a mobile player. The didactical scenario is of major importance to the acceptance of the use of podcasts in higher education. A question given to all students who never used podcasts before pointed out that about 30% mentioned that the podcast is not relevant for the examination; furthermore 30% are not interested in podcasts in general.

Except of a few recordings after a lecture unit all podcasts result from live-recordings. Though the average duration of a podcast was about one hour and therefore lasted much more longer than recommended by Wunschel (Wunschel, 2007) "The perfect podcast lasts about 20 minutes and shall be occur once in a week whereby the size of the downloaded file is of no greater importance." The acceptance of the podcasts did not depend on the time factor but on the way the content was presented. The lecture "Mechanik 1" was recorded by using a tablet pc on which the professor was able to develop the learning matter (mainly mathematic calculations) step by step. The acceptance for those podcasts was very high (mentioned by oral feedback of the students). The benefit for the students declined without the possibility of reproducing so

to say “growing content” and “only” consuming prepared content having been recorded during presentation with PowerPoint or similar software (as it was done in the lectures “Informatik 1” and “Elektrische Energiesysteme 1”). Nevertheless the students appreciated the live character of the recording as an important quality and reason to listen to the lecture again. This statement points out the importance of the human factor within podcasting and teaching in general.

Students are used to hear lecturers not in a very professional manner. Live recording includes of course speech mismatches or some other noises but the live character may be one of the crucial factors for hearing podcasts. Burgos (Frank Burgos by Campbell 2005) described that aspect in the following way: “Podcasting, done the right kind of way, can ... make a newspaper sound like a human being. Because that’s what newspapers are: they’re a collection of human beings”.

4 Conclusion and Future Work

The usage of podcasting lectures is not to replace presence-lecture times but to enrich them. To reconstruct particular learning content such as difficult mathematic equations it is of high purpose when the student is able to follow it step by step explained and worked out by the teacher. Furthermore the student can do this not only when ever but also where ever he/she wants to because of the independency from end devices. This is also a further step to fulfill the demands of usability engineering which can make learning more effective. With other words (Almonte, Gilroy 2005): “Unlike streaming audio, which requires you to listen in real-time, podcasting lets you control how and when you listen offline.”

Shall the work with podcasts become one of the preconditions for passing examinations? Will podcasts be a good method during preparation times within blended learning scenarios? Which purposes can be reached better by producing short podcast-sequences instead of recording whole lectures? Will there be a significant influence on the attendance at the lecture room when podcasting the lecture?

Considering theses issues it can be said that podcasting will play an important part in the future of e-education. The use of podcasts is rapidly and steadily growing mainly at the expense of radio and is therefore no current hype (Wunschel, 2007). Wunschel mentioned that 46% use podcasts for educational purposes; which is a 59% raise according to previous year’s value. 62% consume video-podcasts as well as audio podcasts. Podcasts are heard in a commute way by two thirds of the users; podcasting can therefore called to be a “commutainment media” (Wunschel, 2007). Furthermore video podcasts are being demanded by many students as well as a download version preferred to a streaming version (Swiss 2006).

Future aims will be to enable searching of written and spoken content within the podcast itself and a central recording control. The first steps towards search within a audio file have already been done by Podscope (<http://podscope.com>) “the first search engine that can find podcasts according to the words spoken during them! (New York Times, July 27, 2005)” and by Yahoo which has an audio search engine (<http://audio.search.yahoo.com>).

However, it must be pointed out, that among technological aspects we strongly have to bear in mind that the profit and success of podcasting definitely depends on the didactic concept surrounding it.

5 Acknowledgements

We would like to express our gratitude to the people who used the podcasts and gave us feedback about their experiences. Special thanks to the Vehicle Safety Institute (a Member of the Frank Stronach Institute Graz) and the Lifelong Learning department of

the University of Technology of Graz for their help. In the end we are equally indebted to Professor Dr. Lothar Fickert, Professor Dr. Frank Kappe and Professor Dr. Ulrich Walder for their activities and the possibility to provide their lectures with podcasting.

6 References

- Almonte, A., Gilroy, K. (2005). Podcast for Learning, © The Otter Group | Cambridge, MA
URL: <http://www.ottergroup.com/blog/archives/2005/9/16/1232728.html>
(last visit 2007-01-24)
- Campbell, G. (2005). There´s Something in the Air - Podcasting in Education, EDUCAUSE Review, vol. 40, no. 6 (November/December 2005): 32–47
URL: <http://www.educause.edu/er/erm05/erm0561.asp> (last visit 2007-01-24)
- Dorok, S. (2006). Podcasting im Unterricht, lehrer-online, Schule ans Netz e.V.
URL: <http://www.lehrer-online.de/dyn/9.asp?path=/podcasting> (last visit 2007-01-24)
- Ebner, M., Stöckler-Penz, C., Gugler, J., Hoschopf, H. (2007). Podcasting – Zukunftschance für die universitäre Weiterbildung?, Zeitschrift für Hochschulentwicklung, ZFHE Jg.2/Nr.1 (März 2007), in print
URL: (<http://www.zfhe.at>)
- Gamböck, B., Pichler, M. (2006). Schöne neue Welt des E-Learnings, Haufe Fachmedia,
URL: <http://www.personal-expo.de> (last visit 2007-01-24)
- Grossman, L. (2006). Time’s Person of the Year: You, 2006 issue of Time magazine,
URL: <http://www.time.com/time/magazine/article/0,9171,1569514,00.html?aid=434&from=o&to=http%3A//www.time.com/magazine/article/0%2C9171%2C1569514%2C00.html> (last visit 2007-01-29)
- Lane, C. (2006). UW Podcasting: Evaluation of Year One, Office of Learning Technologies, University of Washington, URL:
http://catalyst.washington.edu/research_development/papers/2006/podcasting_year1.pdf (last visit 2007-01-24)
- Nagler, W., Korica-Pehserl, P., Ebner, M. (2006), RSS – the Door to E-Learning 2.0, Tagungsband 13. Tagung FNMA-Austria, in print
- Swiss Banking Institute of the University of Zurich (2006), Bildung für unterwegs: Evaluationsresultate der Semester 04/05 und 05/06, eCF Corporate Finance, Swiss Banking Institute of the University of Zurich
URL: <http://www.getinvolved.unizh.ch/podcast.html> (last visit 2007-01-24)
- Townend, N. (2005). Podcasting in Higher Education, Media Onlinefocus 22, British Universities Film & Video Council,
URL: http://www.bufvc.ac.uk/publications/mediaonlineissues/mof22_vf61.pdf
(last visit 2007-01-24)
- Wunschel, A. (2007), Die deutschen Podcast-Hörer – Zusammenfassung der Ergebnisse der zweiten Podcast-Umfrage,
URL: <http://tellerrand.typepad.com/tellerrand/podcastumfrage/> (last visit 2007-01-24)