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Student-led Podcasting for Engineering Education

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Abstract

The use of podcasts is challenging traditional communication methods in higher education, with the potential for creating highly engaging and flexible resources for learning and development. In a similar way, podcasts are helping to facilitate a stronger student identity and community within learning environments, replacing traditional student newsletter and website approaches. In this work, an innovative podcasting approach is presented in which there is a strong student-centred and student-led premise to foster and advance engineering education related uses. Podcasts are intended to cover a range of relevant engineering topics such as sharing student views on global and scientific developments, raising issues for current matters important to students and disseminating information on unique educational opportunities. Details on the set-up of the initiative are presented, and include resource requirements, management and organisation structures for an effective interface between academic staff and the student podcasting team, and mechanisms for ensuring that the podcasts maintain balanced educational outcomes.

Keywords: podcasting, student-led activities, experiential learning

1. INTRODUCTION

Podcasts, or *personal on demand broadcasts*, are audio or digital video media files available to be downloaded via the internet to media players such as iPods or personal computers. They are typically viewed directly on a website or by syndicated download or web feeds [1]. There has been a growing interest in studying how podcasting can be used effectively as a learning tool. This is evidenced by the formation of the Informal Mobile Podcasting and Learning Adaptation (IMPALA) project, which is a UK-wide study on the impact of podcasting on student learning in higher education and how the beneficial effects can positively be enhanced [2]. A natural educational use for podcasts has been for distance education courses [3]. In fact, podcasting has been used to reducing effects of isolation and promoting inclusion for distance learners [4]. The use of podcasting is also rising as a campus-based learning tool [2,5,6]. Video podcasts have been found to be beneficial in an engineering course where in addition to entire lectures, supplemental materials were also published [7].

In a similar way, *digital stories* (i.e. audio recordings enhanced with still images) can also enable experiential learning through reflection and storytelling. Digital stories as told from the perspective of students can be used as method for student reflection. Student-created digital stories that documented their experiences of the first week at university were found by students and staff to be a very positive experience for encouraging engagement, creativity, and reflection [8].

The podcasting approach supports Imperial College's *EnVision* project, whereby significant activities are underway to enhance the student learning experience; see Alpay et al. [9]. Specifically, considerable efforts are being made to: further enthuse students towards a career in engineering; raise the student awareness as to their potential impact on the *big issues* (e.g. climate change, population growth, renewable and alternative energy); develop and disseminate activities for global skills

development; and encourage interdisciplinary work approaches through design projects and real-life experiences. In line with such developments, a student-led podcasting unit would enable a direct and effective communication medium with the student body and help facilitate a unified student identity and community amongst the different engineering departments. The podcast format also opens opportunities for new methods of student engagement and involvement in educational topics, debates and developments.

In this work we describe the set up of an on-going student-centred and student-led podcasting group. Undergraduate engineering students oversee the entire podcast production process, from concept to creation to editing and distribution. The podcasts cover engineering related topics of interest to the team and are intended to enhance engineering learning and engage other engineering students and the broader campus community. In this paper, attention is given to the design and implementation of the project, as well as some key lessons learnt from the start-up phase. The general methodologies and organizational structures described for the student-led set-up will be of interest to the educational community as a whole.

2. METHODOLOGY

2.1 Project Design

Unlike most implementations of podcasting in education, which consist of posting videos of lectures and supplementary material for courses, in this project the students inspire the educational topics and create the content of the podcasts themselves. Such a strategy not only promotes experiential learning for the student team itself, but also fosters student motivation and active engagement to provide the sustainable delivery of a podcasting service which has strong links between students and academic staff.

The project was designed to span 12 months and broadly consists of five phases: recruitment; needs analysis; pilot studies; operations and management; and guidelines and site finalisation (Figure 1).



Figure 1. Workflow for the phases of the podcast project

Key facets of each project phase can be summarized as:

- Recruitment: Students are recruited to undertake the set-up of a Faculty of Engineering podcasting unit and to pilot the first student-led, student-centred podcasts. Specific training is given to the students on podcasting technology and practice, science communication and interview methods by experts in the field.
- Needs analysis: An examination of needs to determine the scope and goals of the podcasting program. In addition to forming ideas amongst the group itself, the team explores the views and desires of their peer group and academic staff on a podcasting activity. The group also identifies the resource and technology needs for podcast creation and editing as well as website management and development.
- Pilot studies: Once several podcasts on a variety of topics have been prepared (fully edited audio files with still images), they are made available for students, staff and educationalists for their reviews and feedback. Two key podcasts are used for the detailed evaluation on the student impact. The first involves an educational piece on a core-engineering topic and the second a more general student matter. Attention is also given to the user-interface for downloading podcasts and the set-up of a free subscription service, and indeed whether the site location is optimal for dissemination to engineering students and the broader campus community.
- Operations and management: Efforts focus on the preparation of podcasts, editorial aspects and sustainable management issues. This also involves a resource analysis for the ongoing delivery of podcasts.

- Guidelines and site finalisation: Based on the findings and recommendations of the team, the production of guidelines, remits and resource requirements for the ongoing management and running of a student-led podcasting unit.

Facilitators (an academic staff member and postdoctoral assistant) are involved in the early development of the team and to monitor the evolution of the podcasting project. Regular meetings are held with the student team and project management tasks and roles are identified early on in the needs analysis phase. Students are also encouraged to devise a plan to ensure that the first podcast trials are carried out within the first half of the project timeframe.

2.2 Student organizational structure

While generally the podcasting project is student-led and student-driven, it was necessary for the facilitators to introduce a basic organizational structure to the podcasting team. This helped to clarify the individual roles and responsibilities of the team members in order to move the project more rapidly into the needs analysis and pilot studies stages. The organizational structure of the student team is represented in Figure 2, and was in fact devised through consultation with the student team (see discussions below). The facilitators and the Learning Technologist serve as advisors to the team and are careful not to direct the operation of the group while still offering guidance and advice when necessary.

With reference to Figure 2, the podcasting team consists of four sub-teams: Producers and Editors, Reporters and Interviewers, Podcast Technologists, and Marketing and Communications personnel. Each sub-team has a member appointed as the head who is responsible for conveying the sub-team's activities to the heads of the other sub-teams. The Producers and Editors sub-team is responsible for identifying and shaping the themes and topics and carrying out the research for the podcasts. The Head Editor is responsible for overall team liaison, and to giving progress updates to the facilitators. The Reporters and Interviewers sub-team is responsible for aspects related to interview design and organization. This may include creating scripts/questions for interviews, maintaining and training others on the use of the audio recording equipment, or conducting interviews themselves. The Reporters and Interviewers will frequently interact with the Producers and Editors sub-team and the Podcast Technologists, acting as the bridge that allows the concept to become a real podcast. The Podcast Technologists sub-team is responsible for creation and development of the podcasts (e.g. combination of audio and images using editing software such as Audacity) and managing and structuring the website for podcast downloading and viewing/listening. This product is given to the Producers and Editors to ensure that the podcast satisfies the original vision. The Podcast Technologists may also seek advice and guidance from the Learning Technologist on ways to make use of the existing technology resources within the College. Finally, the Marketing and Communications sub-team is responsible for promoting the efforts of the podcasting team and the website among the students of the Faculty of Engineering as well as the larger College community.

2.3 Implementation outcomes

To date, four months into the project, the work has reached the pilot studies and operation and management phases of the project plan. As such, it is possible for us to comment on key lessons learnt during the project initiation and implementation phases, and thus on some good practice for the start-up of a student-led podcasting scheme. Firstly, the recruitment of students to the podcasting project proved to be very easy. Students with a broad range of project interests and motivations were attracted to the podcasting unit concept. Interests included experiences in journalism and science communication, as well as exposure to the technological aspects of podcast production. Engineering students at all undergraduate levels were invited to apply for a place in the team. A maximum team size of 9 was felt to be manageable in terms of internal organization, and would also allow one representative from each of the 9 engineering departments within the Faculty of Engineering. However, because of significant student interest, the team size was increased to 14 students.

After the team was formed, a two-hour training session was given by a professional broadcaster (G. Mitchell, BBC Radio 4) on podcasting technology and practice, science communication, and interview methods. In this session, the students were also exposed to the use of state-of-the-art recording equipment and audio editing software. The session also concentrated on team formation aspects,

allowing students to share personal aspirations for the project and agreeing on ground-rules to help foster open and supportive communication and interaction styles.

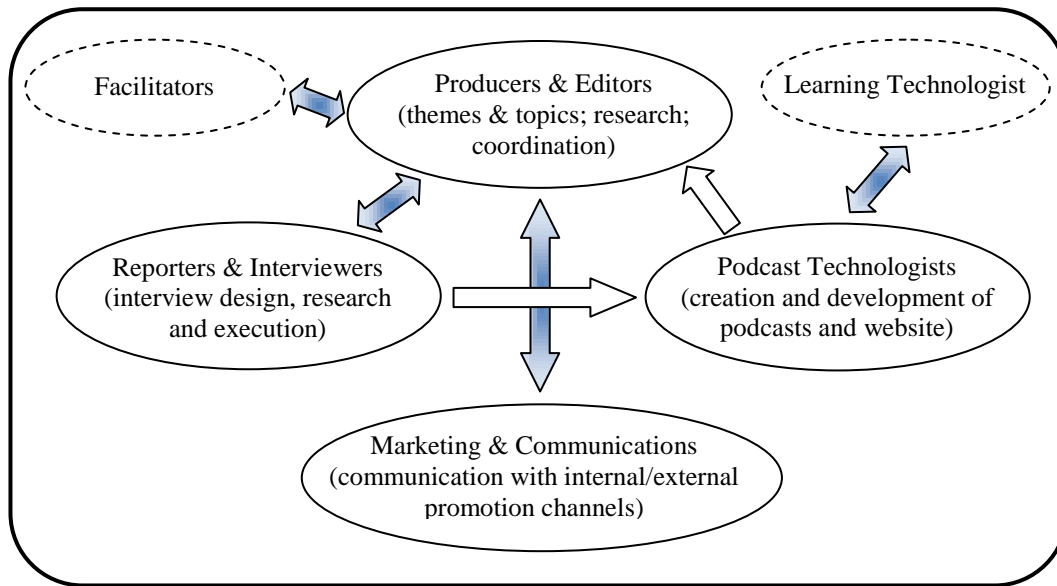


Figure 2. Schematic of the team organizational structure

At the onset of the project, there was some concern as to the equipment requirements for high-quality podcast production and editing. However, after consultation with the professional broadcaster, the group were able to establish a minimum equipment inventory. Key hardware items include a professional digital recorder (Marantz PMD660), a high quality broadcasters microphone (Beyerdynamic M58) and a microphone stand. Audio editing could be undertaken using free, open-source software (Audacity), and image-enhanced digital stories produced through a number of commercially available software, such as Camtasia and MS PowerPoint Producer for PC based systems.

Initially, students were given much scope to develop the organization and management structure of the group. However, this process was found to be rather difficult mainly because of the large group size, the mix of students from different departments, and the relatively ineffective email communications between the bi-weekly face-to-face meetings. After intervention from the facilitators, an organizational structure (Figure 2) was developed and sub-teams populated based on specific student interests. With the organization solidified, the group began considering issues related to developing the team identity. Discussion was given to deciding on a team name and creating the team logo, which further helped to promote a strong student identity. A group page was also formed on the social networking site Facebook which provided a single web-location for sharing ideas and having virtual conversations between team (and sub-team) members. This was found to be a particularly powerful tool for group facilitation, increasing the frequency and quality of communications between meetings. Within Facebook itself, the organization of the discussion forums mimicked the group organization structure, thus effectively ordering the information flow. Nevertheless, through their own choice, the students produce formal minutes after each face-to-face meeting which is forwarded to the facilitators for information and comment.

The needs analysis stage was facilitated by providing the students with a range of suggested topics for podcasts, so as to spur discussion and the brainstorming of ideas. Specifically, these topics included: the sharing of student views on current political, global and scientific developments which have a direct impact on the role and responsibilities of future engineers; the sharing of the experiences of senior students, alumni and teaching staff on learning matters (e.g. skills, learning approaches, stress management, career planning); providing a means for students to raise awareness and discussion on matters such as gender and cultural issues in engineering; providing engaging anecdotes on specific core-engineering topics; and providing a forum for disseminating information on student opportunities such as Undergraduate Research Opportunities Programme (UROP), Engineers Without Borders and other cross-faculty activities. This activity was intended to motivate the team to conduct the needs analysis for the podcasting project. The team also met with the Faculty of Engineering Learning Technologist to gather ideas to structure the main webpage with the interview / recording activities.

The group decided to begin by offering access to the digital stories and interviews on a College hosted website. In a second stage, once the system of content creation and editing had sufficient momentum, access to the series of podcasts via an RSS (Real Simple Syndication) feed or iTunes, as well as broadcasting through a public page on Facebook, would be implemented.

The pilot phase of the project has involved trial interviews and subsequent audio editing. Although basic training on audio recording and interview technique was provided, these trials have proved to be a great learning opportunity for the students. Specifically, learning on: how to capture sound in bustling student areas, how to engage and maintain the attention of interviewees under *street-interview* situations, and how to manage, label and categorize recordings for subsequent review and editing. In parallel to the pilot studies, operation and management issues have been further addressed, such as protocols for consistent product (podcast) design, equipment management and timetabling for a schedule of interviews, and the website design which best promotes the material to a mixed cohort of engineering students.

Thus far, the student team has developed a basic structure for their initial two podcasts, one on a core engineering topic and the other focussed on student-life topics (Table 1). The team identified a few topics for the core engineering podcast but decided on *photovoltaic technology* as a first topic. Nuclear energy, water management and recycling are other topics of interest and are currently being researched by the team. For the student-life podcast, the team collated topic suggestions via a thread on their Facebook group. This extensive list includes student reasons / motivations for their specific engineering course, the teaching and learning experiences within the College, coping with study and exams, and interesting, unusual or emerging career paths for engineers. Student interview recordings are currently being collated before the production and editing team decide on the specific content of a series of podcasts.

Core-Engineering podcast (10-20 min)	Student Life podcast (10-20 min)
<ol style="list-style-type: none"> 1. <i>Theme introduction and content overview (including interesting quotes from the upcoming material)</i> 2. <i>Biographies of key contributors</i> 3. <i>Scientific content</i> 4. <i>Staff & student quotes and anecdotes</i> 	<ol style="list-style-type: none"> 1. <i>Content overview(including interesting quotes from the upcoming material)</i> 2. <i>Q&A, news or student anecdotes</i> 3. <i>Student-life topic</i> 4. <i>Q&A, news or student anecdotes</i> 5. <i>Student-life topic</i> 6. <i>Questions for audience; invitations to submit views on issues mentioned in the podcast</i>

Table 1. Basic structure of two key types of podcasts.

In the remaining months of the project, student efforts will focus on the design and collection of podcast content and the effective promotion of the material to student groups. Students will also be asked to consider recommendations on funding and operational issues for the long-term sustainability of the unit. Specifically, this will include: the type and amount of regular resources needed; the management and organisation structures which maintain an effective interface between staff and students, as well as continuity from one management group to the next; and mechanisms for ensuring that the podcasts maintain a balanced educational premise in line with Faculty/ College developments. Although a description of the organizational and support structures for the implementation of the podcasting unit have been given above, such structures are expected to be further refined as the unit moves from a set-up and development focus towards one of team maintenance and ongoing student-body engagement. Likewise, whilst the facilitators are able to realistically judge future resource requirements (which include nominal administration costs for arranging group meetings, website and learning technology support), ultimately budget control for ongoing and developmental work is to be passed to the students. As such, student ownership in the planning of resource and administration requirements is deemed important.

The facilitators will undertake an evaluation of the effectiveness of the student-led podcasting unit, once a regular service is provided. This will consider the learning and development experiences of the members of the podcasting unit itself, as well as the impact that the unit has had on the student engineering community (e.g. learning, new awareness, improved identity with engineering as a whole). A combination of student questionnaires, interviews and/or focus groups will be used to gauge student views on the quality, content and usefulness of specific podcast transmissions. Lastly, views on the

quality and effectiveness of the podcasts will be sought from senior faculty within the engineering departments at Imperial College.

3. CONCLUSIONS

The student-led podcasting project was developed as a new student resource and community for facilitating learning and communication across the Faculty of Engineering. It provides an innovative communication format for student engagement and involvement in educational topics, debates and developments. At the same time, the team members themselves benefit from skills development in podcasting technology and science communication. The project design and organizational structures described in this paper have proved an effective means for the implementation of the podcasting unit. A combination of face-to-face and web-based communication methods, clear student role and responsibility allocations and strong academic commitment to the podcasting unit, has led to the successful set-up of the unit.

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