Students as Producers: Second Year Students’ Experiences as Podcasters of Content for First Year Undergraduates

Mark J.W. Lee, Senior Member, IEEE, Anthony Chan, Member, IEEE and Catherine McLoughlin

Abstract—The authors are involved in an ongoing project in which a group of second year volunteer students are placed in charge of producing a series of short, talkback radio-style educational podcasts for the students enrolled in a first year undergraduate information technology subject. The entire production process, from inception and scriptwriting through to the final recording, is driven primarily by the student-producers, with minimal lecturer intervention. This paper describes the experiences of the student-producers, elicited through focus group interviewing. The findings suggest that they both immensely enjoyed and greatly benefited from the exercise, which enabled them to revisit previously learnt subject content and present it to other students, thereby enhancing their own understanding of the material. In addition, it afforded them valuable opportunities to develop generic skills such as research and teamwork skills. This is consistent with the principles of peer teaching and learning. The design of the study is outlined, in addition to providing recommendations for educators pursuing similar projects in the future.

Index Terms—Educational podcasting, MP3, student-producer, peer teaching, learning by teaching

I. INTRODUCTION

Podcasting [1], a technology based on RSS 2.0 enclosures [2], allows audio content from one or more user selected feeds (channels) to be automatically downloaded to one’s computer as it becomes available, then later transferred to a portable media player for listening at a convenient time and place. Equipment capable of playing podcasts encompasses a multitude of portable devices, including but not limited to MP3 players, handheld computers, laptop computers and tablet PCs, as well as many modern mobile phones and personal digital assistants (PDAs). This holds much potential in the way of creating true, any time, any place mobile learning that “frees eyes and hands” [3], although users without access to such devices can simply listen to the content on their PCs. Following the widespread adoption and dramatic increase in ubiquity of portable, MP3-capable devices, there has been significant recent uptake of podcasting, both in mainstream society [4]-[6] and in higher education [7]-[16].

In the Autumn (February to July) 2005 semester, the authors commenced a project at the School of Information Studies, Charles Sturt University (CSU) to investigate the use of podcasting to address students’ preconceptions and pre-class anxiety [17][18]. This was in response to the lecturer of a first year undergraduate subject on Internet technologies and XHTML-based web authoring, ITC125 Information Superhighway, discovering from the results of a simple Harvard Minute Paper [19][20] that many of his students appeared to have preconceptions about the subject content and other course-related matters, even prior to the commencement of the first meeting. It was evident that these preconceptions were causing a degree of anxiety about the subject. Creating a productive and satisfying learning experience involves actively engaging students and having them take responsibility for their own learning [21]; such pre-conceptions and anxiety can act as an up-front impediment to effective learning. In addition, modern teaching and learning methods based on social constructivist theory, such as discovery-based learning, problem-based learning and collaborative learning, have a significantly higher probability of success if students come to class already inspired to learn and willing to participate [22].

The authors believe that given the large uptake of portable music players and the increasingly socially acceptable nature of these devices, the use of a series of short audio clips, delivered in a timely fashion through podcasting, can be part of an effective solution to help alleviate students’ pre-class anxiety and allay their concerns about issues such as assessment, and to do so more flexibly and effectively than traditional methods like subject websites and printed handouts. It was decided that the podcasts be structured as a series of weekly, three to five minute talkback radio-style “shows,” with two or more student-presenters holding discussions on pertinent issues related to the subject and its content in a relaxed and informal style. The lecturer and other subject matter experts are occasionally be brought in as “guests” to offer insight into, or clarification of, the more difficult or complex issues and topics.

To this end, a small group of second year students who had
previously completed ITC125 were recruited to serve as producers and presenters of the podcasts on a voluntary basis. This approach is in contrast to many existing educational uses of podcasting, which focus on mere dissemination of instructor-generated material such as lectures. Although the aim of the project is ultimately to investigate the impact of the podcasts on the listeners, this is not the subject of the present paper.

The authors also set out to investigate the potential benefits of the exercise for the student-producers, and therefore deemed it pertinent to study their experiences as well, which forms the topic of the present paper.

II. BRIEF LITERATURE REVIEW ON STUDENTS AS PRODUCERS AND PEER TEACHING

The “students as producers” idea fits into the “participation model of learning” [23], as opposed to the “acquisition” model, whereby learning means becoming part of a community, through participation and contribution of learning resources. Students are creators and producers of knowledge, ideas and artefacts [24]. Furthermore, the approach adopted in the podcasting project at CSU appears to demonstrate the socialisation of learners into both what Gee [25][26] terms a “(big D) Discourse,” as well as what he labels a “(little d) discourse,” since listening to background material presented by more experienced students and being exposed to specialist terminology such as technical computing jargon, helps the new or novice students be better prepared to participate in class activities in particular and the learning community in general. This is also reminiscent of the “legitimate peripheral participation” of newcomers to a community of practice portrayed by Lave & Wenger [27].

Having students from earlier cohorts of a subject teach or impart their knowledge and experiences to new students is consistent with the principles of peer tutoring or teaching [28][29], which has also been variously termed “peer mentoring,” “proctoring” [30], and “supplemental instruction” [31][32], particularly in the US and UK. Advocates of peer tutoring (this term is used most commonly in Australia, and it is the one that would appear to be the most generic) assert that it is a valuable exercise for both the tutors as well as the tutees, since it is a cost-effective way to provide academic support to the tutees, but also affords the tutors the experience of “learning by teaching.” In the words of Whitman [33], peer tutoring is founded on the premise that “to teach is to learn twice.” According to Topping [34], the mere process of preparing to peer teach may enhance cognitive processing in the tutor, as it promotes attention to and motivation for the task, and calls for the tutor to revisit, re-organise and re-integrate existing knowledge. The act of tutoring itself involves further cognitive challenge as the tutor must simplify, clarify and exemplify. In an investigation into the factors influencing the tutoring process, Hartman [35] refers to Stenberg’s [36] theory of intelligent performance, identifying skills which might be enhanced through peer tutoring:

1) meta-cognitive skills: planning, monitoring and evaluating and the associated use of declarative, procedural and contextual knowledge;

2) cognitive skills: perceiving, differentiating, selecting, storing, inferring, applying, combining, justifying and responding.

Similarly, in the design and development of instructional materials, it is the designers who learn the most, since the process of articulating their domain knowledge compels them to reflect on their knowledge in a new and meaningful way. In fact, they arguably learn more than the learners who will be using the materials [37][38].

The theses for the research discussed in the present paper are as follows:

T1) Acting as producers of educational podcasts targeted towards other students benefits the student-producers by enhancing their understanding of previously learnt subject material, as well as assisting in the development of generic skills;

T2) The student-producers perceive the benefits of being involved in such activities, notwithstanding the extra-curricular, non-assessable, unpaid nature of these activities.

III. OVERVIEW OF PODCASTING TECHNOLOGY

Podcasting provides a low-cost, low-barrier tool for disseminating audio content via the Internet, particularly when compared with the alternative of streaming the content. Streaming, which involves playing media as it downloads, often results in poor performance, particularly for users who do not have reliable, high-bandwidth connections. This leads to a “click and wait” situation that adversely affects the viewing or listening experience.

Podcasting overcomes the limitations of streaming by having a computer continuously connected to the Internet, so that bandwidth-intensive content can be “dripped in” and made available when ready, thereby eliminating the “click and wait” [1]. Because the content typically does not need to be listened to live, this time-shifting mechanism does not pose a problem.

Other advantages of podcasting include the fact that it is subscription-based and therefore not subject to unsolicited material like spam, and that subscriptions can be added or cancelled at any time. Users can filter and search content downloaded from a single feed, or across multiple feeds, opting to listen to only those podcasts that are of interest to them. Last but not least, podcasts, being MP3 files, can be transferred to a variety of portable devices for listening to on the move.

Podcasting is based on RSS or RDF Site Summary (also called Rich Site Summary, Really Simple Syndication). RSS-enabled web sites generate a feed of XML data summarising the content of the site, which is monitored by client-side programs called aggregators. An aggregator can be configured to periodically poll one or more subscribed feeds for updates.
and deliver or syndicate them directly to the user’s desktop. RSS content can be filtered based on user-defined criteria, and content can be aggregated from multiple feeds. RSS is a time saver, as the user does not have to manually plough through a plethora of web sites for relevant material; nor does he/she need to continually monitor sites for updates.

It is a specific feature of RSS 2.0 [2] known as enclosures that makes podcasting possible. RSS documents must be well-formed and valid documents conforming to the XML 1.0 specification [39]. The document is published on a web server, and is maintained either manually through editing by hand, or more commonly, generated automatically by server-side software such as weblog and content management systems.

Table II and Table III contain descriptions of the RSS 2.0 elements and their attributes. Fig. 1 shows an example of a valid RSS 2.0 document, containing an enclosure representing a podcast. At the document root is a <rss> element with a required “version” attribute. Subordinate to this is a single <channel> element containing the channel’s metadata as well as its contents in the form of <item> elements.

Table II

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>title</td>
<td>(Required) The name of the channel. If a website contains the same information as the RSS file, the title of the RSS file should match that of the website.</td>
</tr>
<tr>
<td>link</td>
<td>(Required) The URL to the HTML website corresponding to the channel.</td>
</tr>
<tr>
<td>description</td>
<td>(Required) Phrase/sentence describing the channel.</td>
</tr>
<tr>
<td>language</td>
<td>(Optional) The language the channel is written in.</td>
</tr>
<tr>
<td>copyright</td>
<td>(Optional) Copyright notice for channel content.</td>
</tr>
<tr>
<td>lastBuildDate</td>
<td>(Optional) The last time the content of the channel changed. Must conform to the Date and Time Specification of RFC 822, although the year may be expressed with 2 or 4 characters (four preferred).</td>
</tr>
<tr>
<td>pubDate</td>
<td>(Optional) The publication date-time for the content in the channel. Format requirements are as for lastBuildDate.</td>
</tr>
<tr>
<td>category</td>
<td>(Optional) Includes the channel in one or more categories. It has one optional attribute, domain, a string that identifies a categorisation taxonomy. Processors may establish conventions for the interpretation of categories. An unlimited number of category elements may be included, for different domains. A channel may also be cross-referenced in different parts of the same domain.</td>
</tr>
<tr>
<td>docs</td>
<td>(Optional) A URL that points to the documentation for the format used in the RSS file. The value is usually “<a href="http://blogs.law.harvard.edu/tech/rss.%E2%80%9D">http://blogs.law.harvard.edu/tech/rss.”</a></td>
</tr>
<tr>
<td>managingEditor</td>
<td>(Optional) E-mail address of person responsible for editorial content.</td>
</tr>
<tr>
<td>webMaster</td>
<td>(Optional) E-mail address of person responsible for technical issues.</td>
</tr>
<tr>
<td>generator</td>
<td>(Optional) Program used to generate the channel.</td>
</tr>
<tr>
<td>rating</td>
<td>(Optional) The Platform for Internet Content Selection (PICS) rating for the channel.</td>
</tr>
<tr>
<td>cloud</td>
<td>(Optional) Specifies a HTTP-POST, XML-RPC or SOAP 1.1 web service that supports the rssCloud interface. This allows processes to register with a cloud to be notified of channel updates.</td>
</tr>
</tbody>
</table>

Table II RSS 2.0 <CHANNEL> SUB-ELEMENTS (ADAPTED FROM [2])

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>title</td>
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<td>(Optional) Includes the channel in one or more categories. It has one optional attribute, domain, a string that identifies a categorisation taxonomy. Processors may establish conventions for the interpretation of categories. An unlimited number of category elements may be included, for different domains. A channel may also be cross-referenced in different parts of the same domain.</td>
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<tr>
<td>docs</td>
<td>(Optional) A URL that points to the documentation for the format used in the RSS file. The value is usually “<a href="http://blogs.law.harvard.edu/tech/rss.%E2%80%9D">http://blogs.law.harvard.edu/tech/rss.”</a></td>
</tr>
<tr>
<td>managingEditor</td>
<td>(Optional) E-mail address of person responsible for editorial content.</td>
</tr>
<tr>
<td>webMaster</td>
<td>(Optional) E-mail address of person responsible for technical issues.</td>
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<td>cloud</td>
<td>(Optional) Specifies a HTTP-POST, XML-RPC or SOAP 1.1 web service that supports the rssCloud interface. This allows processes to register with a cloud to be notified of channel updates.</td>
</tr>
</tbody>
</table>

Attributes:
- domain: (Required) Domain to which to send a web service message in order to request notification on the channel.
- port: (Required) Port number on which the web service is listening.
- path: (Required) Path to specify when sending the message.
- registerProcedure: (Required) Procedure to call.
- protocol: (Required) Protocol to use when sending the message (“xml-rpc” or “soap”).
- ttl: (Optional) Time to live – The length of time (in minutes) for which the channel can be cached before refreshing from the source. Enables file-sharing networks like Gnutella to manage the RSS source.
- image: (Optional) An image (GIF, JPEG or PNG) that can be displayed with the channel.

Attributes:
- url: (Required) URL of the image.
- title: (Required) Description of the image; used in the alt attribute of the <img> tag when the channel is rendered in HTML. In practice, this should be the same as the channel’s title.
- link: (Required) The URL of the website to which the image will become a link in the channel’s HTML rendering. In practice, this should be the same as the channel’s link.
- height: (Optional) The height if the image (in pixels). Maximum value is 400, default is 31.
- width: (Optional) The width of the image (in pixels). Maximum value is 144, default is 88.
- description: (Optional) Text that is included in the title attribute of the link formed around the image in the HTML rendering.
- skipHours: (Optional) Can be used to specify a search engine box or to allow a reader to provide feedback. Ignored by most aggregators.
- skipDays: (Optional) A hint for supporting aggregators telling them which days they may not read the channel.
- skipWeekends: (Optional) A hint for supporting aggregators telling them which days they may not read the channel.
- day: (Required, Cardinality: 0-7) Value may be Monday, Tuesday, Wednesday, Thursday, Friday, Saturday or Sunday.

Adapted from [2]
On the client-side, podcasting-capable aggregators called "podcatchers," such as Juice [40] and NIMIQ [41], are used to download podcasts. (Apple's iTunes music player [42] also incorporates podcatching capabilities as of version 4.9.) They are configured to do so by supplying them with the URL of the relevant RSS 2.0 feed. The podcatcher continually monitors the feed for enclosures, which are specified by means of the <enclosure> element (highlighted in Fig. 1).

IV. METHODOLOGY

A. Context and Participants

The members of the ITC125 student-producers team were recruited from a cohort of 32 students who had completed the subject in the previous semester. The five members\(^2\) included three males and two females, aged 18 to 20, who were enrolled in the Bachelor of Information Technology (BInfoTech) and Bachelor of Business/Bachelor of Information Technology (BBus/BInfoTech) degree courses offered by CSU.

These students expressed an interest in participating, following an announcement and brief overview of the project by the lecturer in class. The aims of the project were stated to be twofold: firstly, to create audio supplementary material targeted at alleviating ITC125 students’ preconceptions and anxiety, both in relation to the subject content as well as other course-related issues, for dissemination through podcasting; and secondly, to develop a variety of skills in the student-producers themselves. Since ITC125 is an introduction to Internet and web technology which includes coverage of topics such as Internet standards and protocols, XHTML web authoring and online multimedia, involvement in the podcasting project as student-producers seems a logical follow-on for students who have successfully completed the subject and are interested in reinforcing and extending their learning. It was made clear from the outset that the student-podcasters’ participation in the project was strictly voluntary, and that their work would be non-assessable.

The group initially met on a weekly basis, which was reduced to a frequency of once a fortnight as the semester progressed and their own study workload increased. The meetings were structured though relaxed, lasting for approximately one and a half hours each.

The student-producers brought to the group varying levels of knowledge and skill, and different sets of backgrounds and experiences. They were not provided with any formal training, but rather were introduced to the script writing, editing and presentation process by means of examples. They gradually developed competence in the various facets of the process through undergoing a number of practice runs, with decreasing levels of guidance and “hand-holding,” as well as through their interactions with one another. At this time, each member selected his/her own “stage name” to maintain anonymity when the podcasts aired. Some also familiarised themselves with digital audio and podcasting technology through self-directed research and reading in their own time.

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Based on the table provided, the mandatory and optional elements of the RSS 2.0 schema are as follows:

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>title</td>
<td>(Optional*) The title of the item.</td>
</tr>
<tr>
<td>link</td>
<td>(Optional*) The item’s URL.</td>
</tr>
<tr>
<td>description</td>
<td>(Optional) A synopsis of the item.</td>
</tr>
<tr>
<td>author</td>
<td>(Optional) E-mail address of the author of the item.</td>
</tr>
<tr>
<td>category</td>
<td>(Optional) Includes the item in one or more categories.</td>
</tr>
<tr>
<td>enclosure</td>
<td>(Optional) Describes a media object that is attached to the item.</td>
</tr>
<tr>
<td>pubDate</td>
<td>(Optional) Indicates when the item was published.</td>
</tr>
<tr>
<td>guid</td>
<td>(Optional) A globally unique identifier – A string that uniquely identifies</td>
</tr>
<tr>
<td>comments</td>
<td>(Optional) The URL of a page containing comments relating to the item.</td>
</tr>
<tr>
<td>source</td>
<td>(Optional) The name of the RSS channel that the item came from, derived from</td>
</tr>
<tr>
<td></td>
<td>(Required) The URL of the XML version of the source.</td>
</tr>
</tbody>
</table>

\(^1\) All elements of an item are optional, however at least one of title or description must be present.

\(^2\) There were originally six members, however one of the members withdrew from the group following the production of the first podcast, due to personal reasons.
Fig. 2. RSS 2.0 document containing an item with an MP3 enclosure, used for a podcast feed

The lecturer was responsible for the general logistics of the meetings such as organising the venue and writing and distributing meeting minutes. He was also responsible for facilitating the discussion, but gave the student-producers increasing levels of freedom and autonomy over time.

B. Data Collection Procedures

Focus group interviewing [43]-[46] was selected as the data collection method to elicit the views and experiences of the student-producers, for the purpose of addressing the research theses listed earlier. Focus group interviews are particularly suited for obtaining several perspectives on a single topic, and have the added benefit of allowing participants to feed off one another’s thoughts and ideas to fuel the discussion, unlike one-on-one interviews.

A list of questions was developed to help guide the focus group session (Table I). These questions were not intended to be followed to the letter, but instead were designed to assist the facilitator and participants by acting as a starting point to trigger or prompt discussion, as well as providing a broad focus to keep the conversation relatively on topic.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Linked to Thesis No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What are the major incentives / sources of motivation driving your interest in the project, especially given the fact that your participation is not rewarded through formal academic credit? Would you have preferred to have your involvement assessed and rewarded formally?</td>
<td>T2</td>
</tr>
<tr>
<td>2</td>
<td>How did being involved in the scriptwriting, editing and presentation of the podcasts to support the topics in ITC125 benefit you? What did you learn from a subject content point of view? How about other generic knowledge and skills (e.g. teamwork, interviewing skills, research skills)?</td>
<td>T1</td>
</tr>
<tr>
<td>3</td>
<td>What lessons have you learnt from the project, that might form the basis of advice / recommendations for other educators and groups of student-producers pursuing similar projects?</td>
<td>T1, T2</td>
</tr>
<tr>
<td>4</td>
<td>Do you have any further suggestions on how to make this a really good experience for all those involved (student-producers, lecturers, student-listeners)?</td>
<td>T1, T2</td>
</tr>
</tbody>
</table>
The participants were provided with the questions one day before the session to allow them to have time to consider their responses beforehand. The session was recorded on audio tape.

C. Data Analysis

The data analysis approach applied in this study was derived from Berelson’s content analysis approach, described as “a research technique for the objective, systematic, quantitative description of the manifest content of communication” [47]. Originating in communications research, content analysis is a generic name for a variety of means of textual analyses that involved comparing and categorising a corpus of data [48]. Today, content analysis techniques are widely used in the analysis of computer conferencing transcripts, and now combine qualitative and quantitative approaches, which involve not merely counting the occurrences of variables, but also interpreting them through particular theoretical lens. Hara, Bonk and Angeli endorse this dual approach, noting its capacity to “capture the richness of student interaction” [49].

In content analysis, a fundamental issue for the researcher is the choice of unit of analysis, with a choice of, for example, sentences, messages, propositions or thematic elements. In the case of the present study, the unit of analysis chosen was the sentence or phrase, i.e. sentences in which the student-producers expressed a view that contained explicit statements of their experience, which were clustered together as themes. Thus, evidence was sought for the research theses in the actual content of the transcripts. Returning to the research theses that underpinned the present study, a quantitative content analysis approach enabled the researchers to search for verbal indicators of the particular themes and variables as defined by the research theses, i.e.:

--motivation for involvement in the project;
--learning outcomes attained by students (both generic skills and subject content);
--lessons learnt by student participants;
--recommendations on how to improve the experience.

Stages in Analysis: The content analysis of the data was conducted in four steps. A complete transcript was first made from the audio tape recording of the focus group discussions. To ensure anonymity, participants’ real names were replaced with aliases during the transcription process. The entire transcript was converted into a text file. The next stage was to agree on a protocol for identifying and categorising the target variables, and training coders to use this protocol. In this case, two of the researchers undertook the coding task. The transcripts, in the form of text files, were searched for indicators of the above themes, i.e. instances where students expressed a view that was clearly indicative of the variable being investigated. For example, in seeking indicators of motivational reasons for engaging in the podcasting exercise, certain keywords signalled motivational statements:

“I think one of my main incentives, well not so much incentive as more motivation, was to give back to the community and to the students coming along.”

These instances were collated, classified and then counted. Following the coding by two researchers, the coders’ decisions are compared to establish interrater reliability. The final stage was to combine the results of the coding process and report on the incidence of the target variables.

V. The ITC125 Podcast Production Process

A. Script Writing and Editing

The student-producers were proactive and self-regulated in their work. They brainstormed, discussed and debated ideas for the podcast scripts during their meetings, with minimal intervention from the lecturer, whose role was simply to facilitate the discussion and remind the student-producers of their overall goal: to create material that would address the preconceptions and anxiety of students undertaking ITC125.

A member of the team was responsible for documenting ideas for later follow-up. One or two members would typically take “ownership” of a particular script idea by agreeing to undertake the necessary research and to produce a draft script. Draft scripts were circulated amongst the group to provide opportunity for input from all members. Limited quality assurance support was provided by the lecturer, mainly in the way of ensuring the accuracy of facts mentioned and correcting the language expressions used.

Of the script ideas generated, several were abandoned midway through the production process due to a variety of implementation-related difficulties; others were produced but never aired as a result of a unanimous decision from the team members. For example, a script idea on how to perform XHTML coding was abandoned because of the difficulty in explaining this technical topic without accompanying visual aids; two episodes entitled “Searching and not finding” and “Fun searching with search engines” were taken through to final production but never podcast as the team was dissatisfied with the quality of the end product and its presentation. Nevertheless, in all cases, the ideas and artefacts produced were retained and may be revisited at a later stage.

A total of six podcast episodes were produced and distributed to student-listeners via podcasting (see Table IV).

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>“Introduction to the subject”</td>
</tr>
<tr>
<td>2</td>
<td>“Oops…I missed my first lecture”</td>
</tr>
<tr>
<td>3</td>
<td>“Textbooks”</td>
</tr>
<tr>
<td>4</td>
<td>“What is XHTML?”</td>
</tr>
<tr>
<td>5</td>
<td>“Right to copy or copyright? – Part 1”</td>
</tr>
<tr>
<td>6</td>
<td>“Right to copy or copyright? – Part 2”</td>
</tr>
</tbody>
</table>

B. Presentation

Like the script writing and editing process, the casting of roles for each podcast episode was a team effort, with decisions made in a democratic manner. For example, through their experiences, a team decision was made that in general, a
female presenter or host should be used to interview a male guest, and vice-versa, so as to ensure sufficient contrast so that listeners are able to easily distinguish between the two voices. The team was familiar with one another’s strengths and weaknesses, and through their participation in the many recording sessions, each was able to develop his/her own unique podcast “persona.” Once again, the lecturer provided minimal input but was on hand to offer general guidance and assistance where needed.

In preparing for a recording session, the presenter(s) had access to the full script. (Invited guests were supplied only with a list of questions to be asked.) The team typically conducted one or more informal rehearsals (Fig. 2), during which the script was tested and appropriate modifications made. Minor changes to wording and even swapping of roles often occurred as a result of this testing, as did variations in logistics such as seating configurations and equipment setup. For the earlier episodes the rehearsals were also especially important as a confidence building exercise for the presenters.

During a recording session, scripts were used as a guide and were often subject to impromptu variation and improvisation at the discretion of the presenter(s), who tried to avoid simply reading the scripts verbatim so as to provide a more relaxed, natural feel.

There are plans to retrospectively edit the original scripts to reflect the actual presentation, and to make them available for download via the web. This is for the benefit of students without access to digital audio playback equipment, and will also cater for the hearing impaired/disabled. However, limited progress has been made to this end at the time of writing of this paper.

C. Audio Recording and Editing

Digital audio recording and editing was carried out with the assistance of the Charles Sturt University Learning Media Lab (LML) (Fig. 3). Presentations were recorded in waveform (WAV) format using basic recording equipment. Editing tasks included splicing or cutting out mistakes in the presentation, reducing the length of pauses or periods of silence and reducing the sound file size while maintaining an acceptable level of sound quality. The file was then exported into MP3 format for podcasting. Approximately one hour was expended in the editing of each three-minute podcast.

D. Publishing and Distribution of Podcasts

Charles Sturt University’s Flexible Publishing system [50] was used as a platform for publishing and distributing the finished podcasts. This system was originally developed by the university’s Division of Information Technology to provide a means for academics to disseminate electronic supplementary learning materials to students on an ad hoc basis throughout the semester. This allows academics to avoid having to put these materials through the tedious and time-consuming procedures that the core learning materials are subject to. Flexible Publishing is seamlessly integrated with the university’s in-house developed learning management system, my.csu.

When publishing materials on Flexible Publishing, CSU academics have the option of using either a Microsoft Windows desktop application-based Wizard, or by using a WebDAV [51] capable client to perform the necessary file management tasks on the web server. For example, Microsoft Windows 2000 and higher, Microsoft Internet Explorer 5 and higher, as well as Microsoft Office 2000 and higher, are WebDAV-capable, thereby allowing users to perform remote file management tasks as if they were operating on local disks. Materials published on Flexible Publishing appear to students as clickable hyperlinks in the online subject outline within my.csu, in a section labelled “New Resources.”

To facilitate the project, the Flexible Publishing system was extended to allow MP3 files containing podcasts, along with their associated RSS 2.0 files, to be uploaded. This allows students to subscribe to the feeds using their podcatchers, or alternatively to manually download the individual MP3 files via the online subject outline, using a standard web browser.

VI. RESULTS AND DISCUSSION

A total of 24 message units were found in the transcripts, relating to the five major variables being investigated. These
are motivation for participation, benefits of involvement, skills developed, lessons learnt from the experience and suggestions for improvement (see Table I). The content of the student producers’ responses is coded in Table V, according to the major variables and the subcategories identified. Each variable is discussed in turn.

### TABLE V
**CONTENT FEATURES OF FOCUS GROUP DISCUSSIONS**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Subcategories</th>
<th>No. of Message Units</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motivation</strong></td>
<td>Community involvement (1)</td>
<td>Learn podcasting skills (1)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Benefits of involvement</strong></td>
<td>Enjoy volunteering (1)</td>
<td>Learning opportunity (1)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Subject matter and IT skills (1)</td>
<td>Scriptwriting (1)</td>
<td></td>
</tr>
<tr>
<td><strong>Skills developed</strong></td>
<td>Research skills (1)</td>
<td>Teamwork (3)</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Being critical of others’ work (2)</td>
<td>Learning to communicate (2)</td>
<td></td>
</tr>
<tr>
<td><strong>Lessons learnt</strong></td>
<td>Need for presentation skills (1)</td>
<td>Awareness of script reading (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Importance of scheduling (1)</td>
<td>Consider ethical issues (1)</td>
<td></td>
</tr>
<tr>
<td><strong>Suggestions for improvement</strong></td>
<td>Keep it short and sweet (1)</td>
<td>Be creative, go beyond lecture content (1)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Target Areas of interest to students (1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 24 100.0

### A. Motivation

Motivation to participate in the podcasting project as student-producers was characterised by a number of diverse responses. Table 1 shows the frequency of the occurrence of these responses. Motivational factors included desire for community involvement and volunteering, and to contribute to the learning of other students.

### B. Benefits of Involvement

Students reported that the benefits of involvement were development of specialist IT and podcasting skills, career development, and scriptwriting.

### C. Skills Developed

Participants elaborated on the types of skills they valued most, which were generic rather than specialised in nature. About one third of comments made related to the development of generic attributes such as research skills, teamwork, the ability to critique others’ work and learning to communicate. Student elaborations and utterances on these skills were the most salient feature of the transcripts.

### D. Lessons Learnt / Areas for Improvement

In response to questions asked about what lessons were developed as a result of their participation in the project, participants displayed high levels of meta-cognitive skill in being able to identify areas where they had skills deficits, i.e. developing oral presentation skills, scheduling, script reading and editing. Other findings related to how the experience could be improved, both for participants themselves and also for other students. Students were aware of the need to keep the podcast short and focused, creative, closely aligned with the interests of students and not simply a reiteration of lecture content.

The results showed that the majority of message units (about 31%) were focused on the generic skills that students developed as a result of participating. If the variable “benefits of involvement” were combined with “skills developed,” the results would show that 48% of utterances were related to advantages that students experienced as result of their participation. Overall, these results show that student involvement and engagement in the production of content for podcasts was a positive learning experience. The analysis of focus group discussions demonstrated that students reflected on the podcasting activity and viewed it as a form of experiential learning that yielded positive gains for them in terms of technical and generic skills.

### VII. Future Plans

As mentioned earlier in the present paper, work is underway to collect and analyse data that will reveal the impact of the podcasts on the student-listeners. Depending on the results of this analysis, further refinement of the content and format of the podcasts will be made, in order to ensure that they are aligned with and relevant to student needs.

In the near future, the authors also intend to extend their work on students as producers to facilitate two-way interaction between the student-producers and student-listeners to allow them to form mentoring and coaching relationships and engage in collaborative learning experiences that are richly beneficial to all those involved. An ancillary part of this study will involve examining the possibility of re-using what Mayes [52][53] refers to as “tertiary” courseware material, that is, recording the interactions between the mentors and mentees and making these available to other learners in the current and/or subsequent cohorts. A carefully planned and designed content management system will be critical to the success of this endeavour.

Furthermore, the authors will explore strategies for easing the uptake of podcasting by tertiary teachers. While the technology largely has a high level of social cachet amongst the students, who have little or no trouble using it, widespread adoption at an institutional or departmental level may face resistance, or at the very least, apprehension, from academics who may question if podcasting is really worth their time and effort. The authors believe that with the aid of the appropriate
tools and resources, podcasting can be easily integrated into the professional practice of tertiary teachers. For example, academic web publishing platforms such as CSU’s Flexible Publishing system can be further extended to provide truly transparent, drag-and-drop podcasting functionality so that teachers need not have an understanding of the underlying RSS in order to podcast. This can dramatically reduce the complexity and tediousness of educational podcasting for less technically experienced academics.

Finally, there are plans for the development of a resources kit incorporating technical guides or “HOWTO’s” relating to MP3’s and podcasting, as well as a set of best practices for the design, development and distribution of educational podcasts.

VIII. CONCLUSION

Through their observations and experiences, as well as their findings in this study, the authors believe that placing a group of more experienced students in charge of producing and presenting a series of educational podcasts targeted at new or novice students is a beneficial exercise for the student-producers that exhibits many principles similar to peer tutoring or teaching. The student-producers appear to be highly committed and motivated to work towards producing high quality learning outcomes for their audience, even though their participation is not assessed or rewarded by means of formal academic credit or financial remuneration. The motivation to participate in the project is instead related to the experiential and creative nature of the podcasting activity, perhaps its novelty value, and as results demonstrate, to the development of generic skills ensuing as a result of that engagement.

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REFERENCES


