

UNIVERSITY OF KWAZULU-NATAL

**CAN “PODCASTS” SIGNIFICANTLY HELP IMPROVE FIRST TIME, FIRST
YEAR ECONOMICS STUDENTS’ RESULTS?**

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Abstract:

The discipline of Economics is proving to be a challenge to, most especially, previously disadvantaged students. This is due in a large degree to the failure of the South African secondary education system to effectively prepare these students for the rigours of tertiary education. HESA research has indicated that the language and mathematical skills of university entrants is such that they require significant support. In addition, the ‘massification’ of the tertiary education system and the associated pressures placed on the universities related to lack of resources, both human and capital, has necessitated investigating alternatives to the traditional tertiary education model to provide these students with this assistance. This research investigates the potential of podcasting to provide this support. The primary research is conducted using an action research model, to compensate for changes brought about by the introduction of new technology and learning effects between research iterations, something which a more structured, positivist methodology would not accommodate with ease. The analysis that forms the backbone of the data interpretation on the other hand is based on a more positivist paradigm; it uses objectively measurable information in the form of results achieved by the various tranches of students, both as experimental subjects and control samples. The secondary research is in the form of a questionnaire, the results of which were analysed using the SPSS statistical package. These results indicate that there are no fundamental differences between South African students and those in the developed nations where this technology has been successfully implemented already. Research done in those countries indicates no negative impact, on amongst other variables, lecture attendance. As a result, there is little likelihood that the availability of podcasts will adversely affect the lecture attendance of students who regularly attend lectures, which is a concern voiced by a significant number of academics. In addition, as long as the podcasts are made available in line with the “ubiquitous computing” model that students are comfortable with, they will embrace it. This is an important insight; the research indicates the existence of a “digital divide” based on higher-level technical skills. The latest generation of podcasting technology is simple to use, both for the person recording and the person using it and provides the student with a level of flexibility that matches the Generation Y lifestyle. The research furthermore indicates that access to podcasts will have a statistically significant positive impact on student success in the tertiary milieu; at least as far as the discipline of Economics at first year level is concerned.

Table of Contents

List of Tables and Figures	5
1. Introduction	6
2. Background and Context	8
3. Literature Survey	11
3.1 The Genesis of Podcasting	12
3.2 Podcasting and Education	13
3.3 Some South African challenges	23
3.4 Access is a critical success factor	25
3.5 Podcasting and off-campus students	30
3.6 Cognitive learning theory and mobile-learning	32
4. Problem Statement	35
4.1 Research Objectives	38
4.2 Research Questions	39
4.3 Importance/Significance of the Study	39
5. Research Design and Methodology	41
5.1 Ethical Requirements	58
5.2 Representative Sampling	58
5.3 Limitations of the Study	61
6. Data Analysis	63
6.1 Primary research findings	73
7. Conclusion	77
7.1 Conclusions: Podcast impact on lecture attendance	80
7.2 Conclusions: Podcast impact on pass rates	81
7.3 Answering the Research Questions	83
7.4 Concrete Intervention Strategies	88
7.5 Conceptual Reflections	93
7.6 Recommendations for Future Study	97
Bibliography	100
Glossary of Terms	108
APPENDIX 1	110
APPENDIX 2	113

APPENDIX 3114
APPENDIX 4118
APPENDIX 5121
APPENDIX 6122

List of Tables

Table 1 - Podcasting Categories	...44
Table 2 - ECON1D0 – 5 Year Data	...73
Table 3 - Sheffé Test Results for ECON1D0	...74
Table 4 - ECON1C0 – Five Year Data	...76
Table 5 - Sheffé Test Results for ECON1C0	...76
Table 6 – Comparative Pass Rates	...82

List of Figures

Figure 1 – Hours of Video Uploaded per Minute (YouTube)	...16
Figure 2 – Final Mark Comparison – Random Sample – ECON102 – 2006	...47
Figure 3 – DP vs. Final Mark Comparison – Random Sample – ECON102 – 2007	...47
Figure 4 – 2008 – Podcast User Results	...64
Figure 5 – Demographically Matched Sample Test Results – 2008	...65
Figure 6 – Podcast user DP vs. Final Mark	...65
Figure 7 - Demographically Matched Sample DP vs. Final Mark ECON102 – 2008	...66
Figure 8 – Ownership of MP3 Player	...67
Figure 9 – Use of Podcasts	...67
Figure 10 – Lecture Non-attendance	...69
Figure 11 – Reasons for Non-Attendance	...70
Figure 12 – Lecture Attendance when Recordings are Available	...72
Figure 13 – Kernel Density Estimates ECON1D0	...77

1. Introduction

The discipline of Economics poses a number of challenges for the University of KwaZulu-Natal student body. The first and second year class have no choice in taking the subject, as it is a compulsory element of the B.Com. degree structure. This implies that it is what could be termed a ‘grudge’ purchase. Experience within the discipline has led to the use of a problem–solution approach as the preferred mode of instruction. In light of this, the aim of the syllabus is to initially introduce students to the theoretical constructs, and then apply the theory to real-world problems. To achieve this outcome, students are exposed to an integrated teaching approach consisting of a number of complementary modes of study: attending face-to-face lectures, doing guided reading and accessing relevant information using a number of on and off campus resources.

This research critically evaluated the feasibility of adding another mode, that of podcasting. In order that the overall pedagogic outcomes are achieved, students have to have a firm grasp of the underlying theory and discourse; this is the focus of the first year Economics module. Due to time and physical resource constraints, the School of Economics and Finance on the UKZN Westville campus no longer provides tutorials at first year level. The “Augmented Economics” sub-group have access to small group support structures; however, they are a minority (less than 10%) of the overall first year group.

It is suggested that part of the problems with the subject encountered by students in their first year (indicated by the high failure rate and the rate of repetition of first year Economics modules), relates to the fact that students are being challenged by language as part of their university introduction to Economics, much like other subjects (Stephen, Welman, & Jordaan, 2004). The topic is also of a somewhat esoteric nature, being a mostly theoretical science. In addition, there is a fundamental break in the mode of delivery between secondary and tertiary instruction, from small classroom groups with individual attention to large lecture hall venues, with an ‘impersonal’ mode of instruction, as is the norm for most undergraduate courses within the Faculty of Management Studies, UKZN.

It is proposed that the development of “podcasting study material” represents an opportunity for students to overcome some of the problems related to the study of Economics and that the current research will allow the degree of impact of the podcasting material to be measured using statistical tools. The availability of the podcasts allow students to access the material and the lectures as required and at their own pace while providing a level of flexibility that matches their lifestyle. “The overriding concept behind the podcast™ is that the end user can replay the broadcast at their convenience time after time, whilst being on the move” (Townend, 2005). Obviously, this observation assumes that the end user has access to suitable portable playback technology. Copley (2007) summarised the uses of the technology thus: Podcasts suit distance learning, but are also being used to deliver supplementary lecture materials to campus-based students. “Both applications, may ultimately lead to mobile learning (‘m-learning’), through which students access course materials, at their convenience through WiFi or 3G enabled devices”. These developments have been found to be beneficial in tertiary education institutions in the developed nations (Bonucci, 2007). This is not to say that the experience in these countries is in any way directly transferable to the South African context – the ‘uniquely schizophrenic nature’ of the education milieu in South Africa makes the need for this research all the more compelling. This “description” relates to the fact that while the education sector receives the single largest portion of the budget, the quality of the students that it produces, based on National Senior Certificate results is in steady decline. In 2008, 62.5% of learners achieved a pass mark while 20.1% achieved university admission. In 2009, there was a 2% decline in the overall pass rate with the success rate, (defined as 40%) in Mathematics (29%) and Physical Science (21%) being a major source of concern. There has been a steady decline since 2004 (HESA, 2010).

The risk exists that the digital and hence knowledge divide between the developed and less developed world - South Africa in this case – can potentially become even wider. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) has identified Information and Communication Technologies (ICTs) and their impacts as a major contributor to social and human development (UNESCO, 2010). Therefore access to digital infrastructure and the

information it provides access to closes the knowledge gap and contributes to a better quality of life. This implies that technology can be used to enhance student experience of subject matter and contribute to improve progression rates in a subject that has traditionally encountered high levels of non-performance, to the degree that students describe it as a ‘gatekeeper’ subject in private conversation with the author. The present study deals with the impact of podcasts on the results of students of first year Economics. The use of an Action Research model allowed for the flexibility required to do this across multiple iterations, allowing for learning effects and technological development.

The results of the research indicate a measurable improvement in performance within the sample population. It is therefore posited that this in turn implies a positive impact on assisting South African students to achieve the academic excellence that all tertiary education institutions are striving to achieve.

2. Background and Context

“..., computer-mediated communication can be considered a new mode of information, or a fourth revolution in the means of production of knowledge, following the three prior revolutions of language, writing, and print” (Warschauer & Matuchniak, 2010). This new revolution is happening at the speed of light (literally), as the global fiber optic network expands across the globe it touches everybody – it is both the revolution and the means of spreading the revolution. This means the benefits arrive faster, but it is also much easier to get left behind.

The selection of the topic is based on the researcher’s prior experience with various media while employed in the marketing and advertising field as well as an abiding interest in technology and broadcasting. Being a lecturer in the school of Economics and Finance, combined with a lack of research into the application of the podcasting method of instruction in the Economics field in a South African context, meant that the focus of the study and the selection of a sample group were almost pre-ordained.

The development of cost effective and easy to use multi-media applications, combined with the proliferation of ‘ubiquitous’ computing (Weiser, 1991) at the individual level (in the shape of ‘smart phones’ and other portable digital devices e.g. iPods), has created the opportunity to develop creative and functional education interventions to complement the existing modes of delivery and study in the South African context. “Between 28 September 2004 and 28 September 2005 the number of Google search engine ‘hits’ containing the term ‘podcasts’ increased from 24 hits to more than 100 million. In 2005 the New Oxford American Dictionary chose ‘podcasting’ as its Word of the Year” Searls (2005) cited by (Copley, 2007). Innovations such as YouTube (which according to statistics released by Google in May 2010 has 24 hours of material uploaded every minute) and Apple’s iTunes U (introduced in January 2006), provide free hosting for video material that people produce. This makes it more cost effective for the producer, and could be a driving force behind this growth trend. It cannot be denied that the amount of podcast data, both academic and of a purely entertainment nature on the web has increased dramatically. The threats inherent in these developments are associated with the entrenchment and extension of the ‘digital divide’ (Warschauer, 2003), an especially relevant concept in the new South Africa with its acknowledged chronic skills shortage (Lunsche, 2010). This is due to the rapid adoption and development of ICT based solutions, especially for education (at all levels from primary to tertiary), in the developed world (Rockman, 2007).

Until recently cost was certainly one of the major considerations that entrenched the ‘digital divide’ (Selwyn & Facer, 2007). However, the exponential progress in the development of multi-media applications and hardware as well as the impact of the progress made in the expansion of broadband infrastructure (both wired and wireless) world wide, has to a large degree removed this barrier in the sense of being available. Ironically, the Global Financial Crisis and its impact on the Rand/Dollar exchange rate have also contributed to making the hardware and some software more affordable.

South Africa is not the only country to experience rapid growth in the size of the tertiary sector in terms of student numbers – Australia, for instance, experienced a fourfold growth in

tertiary students (termed massification) in the 15 years leading up to the Millennium – one of the methods used by the Australian universities to absorb this expansion was the effective utilisation of the opportunities provided by online learning and multi-media as part of an all-embracing ICT strategy (Dobson, 2001). In the light of the above, the core purpose of this study was to assess the potential of multi-media applications, specifically in the form of podcasts, as an additional solution to a number of issues relevant to the provision of teaching support for Economics to first time, first year students in a South African context.

In order to assess the impact of the podcasts, a number of pre-conditions had to be satisfied: the development of the material to meet the requirements of the syllabus, providing infrastructure and hardware to make the completed podcasts available to students in a number of formats and providing instructional information on using the podcasts and the feedback channel provided. Once this had been done, the researcher needed to identify a baseline for comparison using historical data of a comparable nature i.e. respondent samples as well as the syllabus content that was being assessed. Fortunately, the data available provided the baseline as UKZN changed to the present ECON102 syllabus in 2005 and the ECON1D0 syllabus had remained the same since 2003, prior to the amalgamation of the University of Durban-Westville and the University of Natal (Durban) into the Durban centre of UKZN. As a prerequisite to the research, it was important to identify correlations in the historical data that would allow the current research project to identify changes over and above systemic changes inherent in the data that are attributable to the effect of the podcasts.

This document is laid out as follows; the next section, chapter 3, comprises of the literature survey which deals with an abbreviated history of Technology Assisted Teaching and Learning (TATL), TATL in a South African context, the issue of access and some relevant elements of cognitive theory. The problem statement constitutes chapter 4, dealing with the research objectives, identifying research questions and indicating the significance of the study. Chapter 5 gives insight into the research design and methodology used in both the primary and secondary research, and highlights the limitations of the study. Chapter 6 relates to the data analysis of both sets of research

results, while chapter 7 discusses the conclusions drawn from the study, relating to among other topics; the projected impact of podcasting on lecture attendance and pass rates, finally the chapter concludes by suggesting intervention strategies and indicates directions for future study.

3. Literature Survey

The concept Technology Assisted Teaching and Learning (TATL), (telematic learning a.k.a. web-based teaching) has been studied by numerous authors over a period of time (Oliver, 1998; MacDougall, 2009). The field incorporates and is linked to a number of sub-disciplines and associated definitions for instance; "Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources" (Richey, 2009). The debate regarding the 'definitive definition' or more accurately an all-encompassing definition is still ongoing, in all probability will do so for some time, as it is affected both by rapid changes in technology and by the changes in the underlying philosophy of knowledge and education paradigm that individual researchers subscribe to. The concept of educational podcasting is of relatively recent origin, having only penetrated the education sector in the new millennium, but is definitely sufficiently important (due to the rapid adoption and pervasiveness of the technology) to qualify as a sub-category of any discussion around the use of technology in education. The following sections highlight elements in the literature around the development and impact of electronic teaching aids of differing types, leading up to podcasting and more recently vodcasting, and how they relate to learning. In addition the author highlights discussions on the impacts (both positive and negative) of the effect of broadband distribution on education within and between nations and races e.g. the creation and duration of the 'digital divide', and the consequent uneven impact on information and knowledge production and dissemination in education. Logically, it becomes necessary to assess if podcasting can contribute to bridging this divide, this is considered in relation to how the technology has integrated into the expansion of distance learning and providing institutions with the capability to service new foreign markets that have to date remained unprofitable. The material also highlights how tertiary

institutions, to manage rapid growth in student numbers and diversity, have used ICT. The final section gives a brief overview of how cognitive theory relates to so-called m-learning (mobile learning), a direct outcome of the entry of podcasting into the education milieu. These somewhat diverse issues all serve to indicate how existing research shows that podcasting can contribute to desired learning outcomes, and in addition, help students overcome some of the disparities in educational opportunities that have come about as a result of historical factors. In the final analysis, one of the effects of globalisation is the creation of a single worldwide market for graduate professionals, and the onus rests on institutions to ensure that their graduates have the tools and skills to compete in that environment.

3.1 The Genesis of Podcasting

In December 2001, Oliver and Herrington (2001) published “Teaching and Learning Online, a beginner’s guide to e-learning and e-teaching in higher education.” The text focuses on the pedagogic underpinnings of various ways to use the Internet and associated technologies as a teaching medium. Podcasts were at that stage not included in what was to become an important work on e-learning and e-teaching. The pre-condition for the development of podcasting was the invention of the Mp3 audio file in 1991, however, it was not until 1998 that the first portable Mp3 player (SaeHan Information Systems’ MPMan) appeared on the market (MacDougall, 2009; Cambell, 2005). In the entertainment field (music downloading and sharing), the driving force behind podcasting was the development of cost effective broadband in the developed world and the opportunities that this created for multi-media ‘narrow casting’.

“Udell (2005) persuasively identified five major factors behind the explosive growth of podcasting and rich media authoring in general:

1. Internet activity is pervasive.
2. Broadband has grown very rapidly, which makes it far easier to consume large media objects.
3. The multimedia personal computer can more or less be taken for granted.

4. The distinction between streaming and downloading of media content has begun to blur. . . . People can now have the experience of streaming while enjoying the simplicity . . . of downloading.
5. Finally, there is the iPod phenomenon and the rapid adoption of portable MP3 playback devices. Udell calls the portable audio device the new transistor radio and points to the beginnings of a renaissance of ‘creative stuff’ happening. Because this renaissance coincides with the Creative Commons phenomenon, traditional business models need not constrain the artist’s work” (Cambell, 2005, pp 38).

3.2 Podcasting and Education

The development of multi-media into a tertiary education tool rapidly developed from the ‘narrowcasting’ concept. Tertiary education institutions in Georgia (USA) have been using iPod-enhanced teaching on a number of courses, including those with international students since 2002 (Lee, McLoughlin, & Chan, 2008). At the University of Washington, a pilot study into podcasting was launched in the 2005/6 academic year – by 26 Sept 2006 Classroom services at the university had recorded 45 823 downloads of course podcasts across 20 courses using 12 facilities across faculties. Each equipped room was configured to record participating courses automatically; accordingly lecturing staff did not need to learn any new technology in order to use podcasting.

“Schlosser (2006) reminds us that ‘[t]he use of audio in education is not new, but is experiencing a renaissance fuelled by the ubiquity of portable audio players, broadband Internet, and software tools that allow the relatively easy creation and distribution of audio files” (Lee, McLoughlin, & Chan, 2008; Chan & Lee, 2005). Prior to the impact of the portability of the podcasting format, audio had not been used extensively in higher education, possibly due to the perception of listening being passive and therefore not sufficiently engaging to create the active construction of mental maps of comprehension. However, Clark & Walsh (2004) set out to dispel these perceptions based on a discussion of the ‘cocktail party effect’ which allows humans to home

in on conversations ignoring other background noise – they calculated humans understand real speech at 10 to 15 phonemes per second under normal conditions and up to 40 to 50 phonemes per second for artificially speeded up speech. Furthermore, they note that “listening is instinctual, [whereas] reading and writing are not – linguistic psychologists have found that unlike with reading and writing, children do not learn how to understand the spoken word, but are hard-wired with the skill” (Chan & Lee, 2005). “A purely sound based medium also allows users to multitask thus paving the way for true mobile learning” (Chan, Lee, & McLoughlin, 2006).

MacDougall, in a more ‘pop culture influenced’ philosophical approach, investigates the effect of the portability of content on the world view or experience of the user and asks the question: will the immersion of reality in the broadcast content affect people’s experience of reality and colour it in line with the objectives of the podcast producer (and reinforce their own pre-existing belief system). He highlights the fact that sound as opposed to vision (which is delimited and consciously focused) is an all-encompassing phenomenon and as such is more likely to affect the user’s world view. In addition he argues, in line with Marshall McLuhan - arguably the most important theoretician in modern media theory - famously stating ‘the media is the message’ (McLuhan, 1964) that due to the ancient nature of the oral tradition the verbal and immersive nature of the podcast gives status to the message. The podcaster gains status - that of the village elder or shaman - and as such influences the listener’s worldview. This, combined with the fact that content is consciously selected, has the obvious possibility of reinforcing previously held dispositions and strengthening a world view - possibly dysfunctional - by affecting the user’s perceptions of reality as the user moves through the world while listening to the voice of authority that surrounds them (MacDougall, 2009; Lowney, 2007). Other researchers go on to mention that the devices have a certain level of social cachet attached to them – this has the effect of making the use of an MP3 player in a social context ‘cool’ (Chan & Lee, 2005). While hardly a fundamental prerequisite for study materials – this cannot do any harm and reinforces the portability and time shifting nature of the devices and associated study materials.

Podcasting in education is best described as a simple to use technology that allows the

lecturer to capture his/her lecture content in a compact recording. This recording may be streamed or downloaded by students onto a computer or compatible portable playback device automatically as it becomes available, if a RSS (Real Simple Syndication) stream is subscribed to (Salmon & Edirisingha, 2008). RSS is one of the “upgrades” that has resulted from the exponential growth of Web2.0 (see glossary for brief description) and its associated applications, courtesy of the increased reach and affordability of broadband. Syndication implies elements of both “push” and “pull” in the sense that the participants subscribe to the feed - “pull” - and that the feed then automatically updates with new information or episodes via RSS feeds – “push”. Podcasting has a further unique element that of “time-shifting” which implies that the podcast is produced at a specific time, but the consumption can happen at any time (and place, courtesy of portability via iPods and other media players). This is not an attribute that is unique to the medium, but one that is important for pedagogical purposes (Lowney, 2007). Aggregator software, (sometimes called ‘podcatcher’ software) such as the iTunes application acts as a ‘behind the scenes’ subscription download manager and then plays the downloaded podcasts on demand. “In other words, the aggregator facilitates the discovery of resources within an area of interest defined by the subscription. The iTunes application will also play the full range of podcast types on a computer and synchronize those resources to an iPod for even greater mobility and convenience” (Lowney, 2007). The only negative aspect of the iTunes aggregator is that it is linked to specifically 1 computer and 1 user, which means it is a less than ideal application in a university environment where students share resources on a LAN. However, there are a number of free and open source aggregators that do not have these restrictions.

Alternatively, students can actively search for and download podcasts they are interested in. To assist with this there is a substantial number of websites beyond iTunesU and the official university websites that make available WiKi search services. Here independent producers can list the podcasts that they have made and paste links for users to follow, for instance www.podcastingnews.com carries a list of a further 70+ podcasting directories on one of its link pages. One of the most striking examples of the effectiveness of this methodology is the

remarkable Khan Academy. Salman Khan created a carefully structured series of educational videos offering complete curricula in math and, now, other subjects (in excess of 2 000 videos), free to the world. At present the academy has approximately 1.000.000 users per month. YouTube hosts a TED talk on the methodology and history by Salman Khan at this URL: http://www.youtube.com/watch?v=nTFEUsudhfs&feature=youtube_gdata where he discusses “flipping the classroom”. His work is focussed primarily at school level material, but the objective is to become a “one world classroom” and there is at present very little evidence to suggest that this methodology is not transferrable to the tertiary milieu.

Associated with this is the phenomenal growth of the use of upload sites such as YouTube: in May 2010 they announced that users were uploading 24 hours of content per minute. The figure below indicates that in the 5 months to October 2010 this had increased to 35 hours or by 46%.

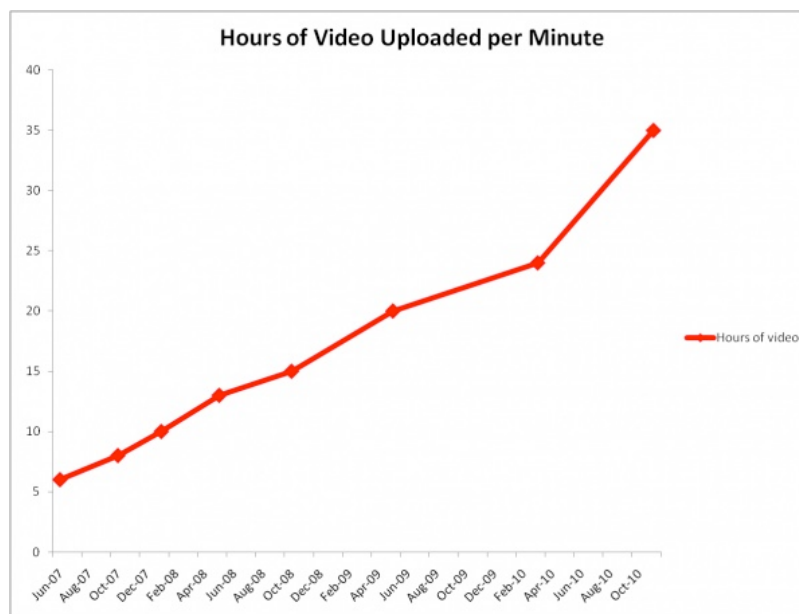


Figure 1 - Hours of Video uploaded per minute (YouTube)

Source: podcastingnews.com

Obviously, not all of the content on sites such as YouTube is academic; however, creative use of the available material can increase student interest in attending lectures and assist with the creation of the connections that we as academics wish to instil in our students. This author makes extensive use of relevant work done by stand-up comedians and services such as Discovery Channel and TED to demonstrate concepts within Economics. Lecture attendance remains high

and the results achieved by students indicate that this approach certainly does no harm.

This technology also has the potential to facilitate student feedback in an innovative manner (Cooper, 2008). The creation of podcasts is made much simpler if the lecturer is using a computer to display slides via data projector. The technology is designed to capture the images synched with the voiceover, and then convert that into a compact movie recording in a number of formats. Audio only podcasts are also possible – were in fact the genesis of the product. Audio has the added advantage of producing very compact files, as the quality of voice-only recordings does not have to be very high to be perfectly audible, hence saving on file size. Should the lecturer prefer the traditional “chalk and talk” methodology, this also may be captured in a compact recording, see for example some of the podcasts produced by MIT (<http://ocw.mit.edu>). It is also possible for a lecturer or a group of students to produce podcasts offline using available tools, some of which are open source, hence freely available. Lowney (2007, pp 9 - 12) indicates a number of formats:

- “Audio with Album Art, a single image used to identify the podcast when combined with cover-flow technology – a form of branding.
- Audio-annotated Slide-shows (aka Enhanced Audio Podcast) used to create an asynchronous presentation, which presents images arranged arbitrarily along an audio time line; this is a very popular form of creative expression on YouTube.
- Original Video produced in a number of formats that can be manipulated via converter and editing software.
- Repurposed Video, using existing material found in archives or downloaded off the Internet via YouTube or a similar site in new ways.
- Video with Chapter Track, using editing software to insert images to create breaks in a video time line.
- Video with Closed Captions – this assists with accessibility for hearing-impaired students.

- Streaming Video, viewed live as it downloads off the Internet or a server on a local intranet – dependent on connection speed for quality.
- Portable Document Format (PDF) Podcasts are also possible but require the Adobe reader” .

Meng (2005, pp 9-10) of the University of Missouri highlights a number of applications “beyond simple recordings of lectures. A variety of other uses to enhance learning can be imagined for podcasting – in fact many of these are already being tested. Following is a sample list of ways that podcasting might be used:

- Audio recordings of textbook text, made available for students by the chapter, would allow students to ‘read’ or review texts while walking or driving to class. It could also be a significant aid to auditory learners.
- Students could record and post project audio and video interviews, which could be automatically downloaded to an instructor’s laptop or MP3 player, for review. The same could be done for language lessons where students forward audio of their pronunciation dialogues. They could even swap these with peers for peer review before turning in the final form to the instructor.
- Oral reports recorded and archived.
- Musical résumés. Music critiques.
- Libraries of bird sounds that the budding ornithologist could receive via seasonal subscription and take with them to the field.
- Downloadable library of high-resolution heart sounds for medical students.”

“Sophisticated multimedia elements like video, animation and interactive media have a high success rate in terms of boosting attention, motivation and interest, but are expensive and time consuming to develop. If well-designed, they may be optimised for reuse from semester to

semester, but are difficult to create or modify mid-semester to suit the needs of a particular cohort” (Chan, Lee, & McLoughlin, 2006). These problems have been laid to rest with the introduction of the new generation of podcast producing software. While still relatively expensive, continual improvement of the technology has now reached a point where it becomes possible to perform the tasks that would have required 4 technical staff for the duration of the podcast, to the push of one button at the start, and another at the end of the presentation. In addition to this the presenter then merely adds a metadata tag (description) and submits the podcast to the server for processing. In effect what has happened is that so-called “ubiquitous computing” - the automated behind-the-scenes completion of complex computing tasks that the initiator is not aware of - has reached beyond the cellular ringtone download to the multi-media production milieu.

Callaway (2009) reports on a psychological study conducted using iTunes University, which showed that university students who downloaded a podcast lecture achieve significantly higher exam results than those who attend the lecture in person. McKinney, who led the study, highlights the fact that the podcast allows the student to replay the more difficult parts of the lecture, allowing them to take better notes. “It isn’t so much that you have a podcast, it’s what you do with it”; McKinney also draws attention to the fact that different staff have different attitudes to access – some are free to the world while others limit access to registered students who attend classes to encourage attendance. Interestingly the podcasts only moved the average mark significantly when it was combined with note taking. McKinney maintains that these technologies are principally there to support lectures, especially for a generation that has grown up with the Internet (Callaway, 2009).

Belanger (2005) maintains that the flexibility extends beyond merely taking notes but provides the students with the flexibility of learning anywhere and at anytime that is convenient, providing a flexible and self-paced learning methodology, very much in line with the prescriptives of radical constructivism. Podcasting furthermore allows greater flexibility with fieldwork – students can record observations or even carry their lecturer’s advice with them to refer to when needed, and it releases them from the dictates of library and multimedia laboratory hours on

campus.

In addition to the impact it has on the students, podcasting also provides educators with unprecedented opportunities to increase the impact of their presentations and to introduce students to the work of other specialists in the field under discussion. The availability of podcasts from numerous highly rated institutions as well as the conversion of programming from, for instance, BBC and the Open University on YouTube provides many opportunities under the creative commons licence agreement to utilise these materials. When dealing with issues such as language and culture this is especially significant as it is not always possible to put the Anthropology 101 class on a jet and to fly them to Borneo. The use of these resources certainly has the effect of increasing student involvement in the classroom activities and once a certain level of skill has been achieved - a level that a significant number of students in the developed world, and increasingly in the developing world, enter university with - students can use the technology to present assignments and projects. (Earp, Belanger, & O'Brein, 2006)

In more current research, Khechine, Lakhal and Pascot (2009) investigate the effectiveness of podcasting technology when teaching online courses. A sample of 104 students, with self-selected access to MP3 audio recordings (podcasts) of a course were given the opportunity to complete an online questionnaire. ANOVA tests were done comparing the group of students who accessed the online recordings (33) with those who didn't (71). Results of the study indicated that the students who listened to the MP3s demonstrated more effective learning in terms of results achieved, greater satisfaction based on the responses to the online questionnaire, more participation in the online activities provided as part of the course, greater studying autonomy and better overall measured motivation than those who did not. The results achieved are encouraging and a number of studies of campus-based students have achieved similar results (Khechine, Lakhal, & Pascot, 2009). It must be borne in mind, however that these studies are part of sophisticated online-based networked solutions, an order of magnitude more sophisticated than that investigated in the study under review.

Evans (2008), on the other hand, used statistical analyses to interpret results of a study into

the use of podcasting for revision of 196 first year undergraduate students in Information and Communication Technology at a London University. Revision podcasts were made available to the students after completing their lectures and prior to the exam. As a prerequisite to accessing the podcast files they had to complete a web-based questionnaire. The questionnaire utilized a 5-point Likert scale to assess attitudes to multimedia e-learning systems, lectures, notes, podcasts and textbooks. It should be noted that most of the students possessed portable multimedia players and were comfortable with the processes and procedures of subscribing to podcasts, however the majority listened to the files on their computers. For purposes of consistency RSS feeds were not used as the research questionnaire had to be completed before accessing the last podcast – RSS would have confounded this due to its ‘push’ nature. This factor may have contributed to the lack of portable access as students had to actively download the material. The results indicated that students believed that podcasts were more effective revision tools than prescribed textbooks. It should be noted that the majority did not ‘multitask’ while using the podcasts, but did favourably comment on the flexibility that access to the podcasts provided. In addition they were more efficient than the students’ own notes in helping them to learn. This could possibly be attributed to the length – only 5 minutes and the fact that they consisted of reviewing learning outcomes and clarifications. Students also indicated that they “were more receptive to the learning material in the form of a podcast than a traditional lecture or textbook. The study suggests that the use of podcasts as a revision tool has clear benefits as perceived by undergraduate students in terms of the time they take to revise and how much they feel they can learn. Coupled with the advantages of flexibility in when, where and how it is used, podcasting appears to have significant potential as an innovative learning tool for adult learners in Higher Education” (Evans, 2008).

Numerous studies on the use of podcasting and the Internet as a teaching and learning tool are available in the literature. The Internet has become an increasingly important feature of the e-learning environment for both teenagers and students in the North American university system, the exponential growth of Web2.0 and the multimedia/interactive platforms that it has provided has increased its user-friendliness to students that are used to the multimedia environment. Perforce the

instructors have had to adapt their style to the demands of the market. For most university students, the Internet has replaced the library and textbooks as the primary tool for learning and doing research for assignments and projects; this is what differentiates the GenY'ers from previous generations of students. To them the Internet is a basic tool; they cannot imagine not using it as the basis for their research. The availability of this technology broadens the resources instructors can offer their students, who perceive that having on-line access to content experts and up-to-date information from original sources support their learning abilities better than using traditional textbooks. The growth of podcasting further matches their learning style, which has been developed from being immersed in multimedia of one sort or another since birth (Sharma, Chalupa, Ahmed et al, 2008).

Pilarski, Johnstone, *et al.*, (2008) discuss their research into the use of podcasting in first year medical education. They found that students generally found the experience positive and interestingly showed that the availability of podcasts did not have a negative effect on classroom attendance. The technology has also been used in Medical courses in South African institutions to good effect. The Faculty of Health Sciences at the University of the Free State has used the technology in addressing high failure rates in the first year Histology course, described as a “killer module”. “A statistical analysis of examination results obtained in the Histology paper of the first semester revealed that students’ positive experience of the podcast method of teaching and learning also manifested in their academic performance” (Beylefeld & Hugo, 2008). Maharaj and De Lange, at the IST Africa Conference in May 2010 have reported similar results regarding attendance at another South African university independently (Maharaj & de Lange, 2010).

In a general discussion of the role of Information Technology in higher education, Dodds stated “University excellence is a product of people - faculty, students, and staff - who play differing roles in the pursuit of scholarship and learning. Excellence is not a product of technology” (Dodds, 2007). Dodds goes on to conclude, “Information technology, can and should be expected to contribute to innovation in university life” (Dodds, 2007). Bonk (2006) sees the promise of podcasting as an important part of “blended learning” where the environment that the

student is in is of such a multi-media, WiFi and broadband enabled nature, that learning happens in an ongoing cycle of asynchronous and synchronous interactions made possible by technology, across continents if required. Dodds and Bonk represent one end of a spectrum that goes all the way from acceptance of and enthusiasm for the possibilities inherent in the technology to active resistance and the perception of the technology as a threat to, amongst other things, discipline and attendance (Lockwood, 2002). While the general trend in the literature is that of a positive outlook towards the use of technology in teaching and learning, Dupagne *et al.*, (2009) contend that video podcasts are not really effective as a test score differentiator. Nworie and Houghton (2008) also warn of the potential negative aspects of the introduction of technology into teaching and learning. Additionally, Salaberry (2001) comments:

“Most existing uses of podcasting in higher education focus on the use of the technology to deliver instructional content such as lectures, which can lead to issues of pedagogical soundness and cause one to question the ultimate educational value of adopting this nascent technology over other, more mature technologies that have been in existence for many years.” This is an example of what Salaberry terms a technology-driven pedagogy.

3.3 Some South African challenges.

The ‘time shifting’ nature of podcasts is one of the technology’s most attractive features. The first year Economics syllabus is pressurised in the sense that there is a finite amount of face-to-face lecture time allocated to complete the syllabus, while staff to student ratios are such that personal attention is not really feasible. In the case of the ECON 102 group at UKZN in Durban there are in excess of 1800 students spread across two campuses. To manage this, the school breaks the class up into groups of approximately 200 to 250 students (timetable permitting) serviced by four staff members concurrently on the Westville campus with a further person on the Howard College campus. Staff members handle 2 groups each, giving the same lectures to both. The syllabus requires that they cover approximately a chapter of the prescribed text every week, which

consists of four 45-minute lectures. Each chapter generally deals with a new topic area, related to, and building on previous knowledge. All the students write the same tests and exams at the same time on the different campuses. This means that there is in effect no opportunity to adjust the pace to the needs of individual students and lecturing is entirely ‘supply driven’. In the light of this, it is hypothesised that culturally diverse students, many of whom have a sub university-standard grasp of basic English – the medium of instruction - in addition to mathematics, central to the grasp of economic theory (Grussendorff, Booyse, & Burroughs, 2010), have an even bigger challenge when faced by the contents of the syllabus and the particular delivery mode. Higher Education South Africa (HESA) research indicates that these concerns are contributing factors to, amongst other issues, the high dropout rates (around 50%) and the fact that only a third of students complete their degree in 5 years (MacGregor, 2009). In the light of the above, the Higher Education Monitor (2007) has made an interesting observation:

“As is still the case in many countries, our higher education sector relies predominantly on *craft knowledge* of the educational process, with academic staff teaching much as they were taught and with traditional approaches strongly reinforced by departmental cultures. Craft knowledge of this kind has served higher education well in conditions of stability and continuity, but, on the evidence of the output patterns, is failing to help produce solutions to the educational problems of the contemporary context. These problems confront many academic staff with challenges for which their own academic backgrounds have not prepared them – such as the challenge of developing students from highly diverse educational and linguistic backgrounds, or the growing demand for e-learning. The key limitation of craft knowledge is that, lacking a systematic or theoretical basis, it does not provide conceptual and analytical tools for dealing with non-traditional situations. As discussed earlier, traditional teaching approaches are not working optimally for many students. The new educational challenges in higher education call for research-based and

scholarly approaches to be brought to bear on teaching-and-learning practice in areas where craft knowledge is not sufficient” (Scott, Yeld, & Hendry, 2007).

Yet another source of intense debate that has surfaced with the advent of podcasting is the issue of the proprietary nature of academic lecture material. Many universities take the view that knowledge is to be shared by all, without cost, and consequently make recordings of their lectures available on the Web, free of charge. MIT has taken the arguably extreme position that this should apply to all their lectures, across all disciplines. An interesting discussion of this may be found in Pollak, wherein he argues for an open access policy to course content at British universities (Pollak, 2008). In the South African context this may well be one of the most critical issues around the technology. Due to the chronic skills shortage that has made South Africa a case study of structural unemployment (Fields, 2000), in addition to the lack of resources to fund education for the mass of the population, the ownership issue and how it is dealt with becomes a matter of great importance (Uys, Nleya, & Molelu, 2004).

This study represents an attempt to use ICT (Information and Communication Technology) technology and infrastructure in the form of podcasts as a means to address, amongst others, these challenges.

3.4 Access is a critical success factor

“Internationally, gaps in Internet access remain persistent. According to one analysis, the percentage of the population who use the Internet in each major world region ranges from 68.6% in North America to only 2.6% in Africa” (Miniwatts Marketing Group, 2006). By July 2010 the same source indicated that Internet penetration in Africa had reached an estimated 110 948 420 users out of an estimated population of 1 013 779 050 population, or 10.9%, a more than fourfold increase in a 4 year period. Of these, 17 607 440 were Facebook users, a 1.7% penetration – 65% of that of the entire Internet user base just 4 years previously. In the South African context affordability remains an access issue due to the inordinately high cost of broadband access due to the government enforced Telkom monopoly on first tier provision. However, due to the nature of

the university business model regarding IT access, these costs are irrelevant; the only cost that the student has to bear, should they wish portable playback, would be the cost of a device.

Mark Warschauer (2000) summarised the access to TATL (Technology Aided Teaching and Learning) debate as follows: access issues based on principally wealth and North American domination of the development of the Internet has historically limited extensive use to white English speaking groups in the developed world. In direct contradiction is the fact that it is potentially the most democratic medium yet created by man, placing the potential for broadcasting (and narrowcasting), academic and commercial research and interaction in the hands of greater numbers of people than ever before. Inherent in this contradiction is the ability to both deepen and bridge the existing historical divides – relating to wealth and power - between groups of people. “This is certainly seen in relation to race, where unequal access to information technology is an important factor in heightening the economic divide between Whites and Blacks” (Castells, 1999, Novak, Hoffman, 1998), “yet at the same time, well-crafted educational programs that take advantage of telecommunications have become an important element of antiracist curricula” (Cummins & Sayers, 1995, Warschauer, 2000).

In relation to the above, the debate related to the digital divide has of late moved beyond a reductionist binary “have vs. have not” discussion, to a discussion of broadening the web beyond its present Western Anglo-Saxon dominated image, driven by the ongoing research of amongst others, Warschauer (2000) in a number of locations in the Northern hemisphere. The underlying binary concepts still ring true in the South African context however, mostly due to:

- The racial wealth gap that the Apartheid system created between Black and White citizens.
- The historically unequal distribution of resources between the urbanised South Africans and the rural former Bantustan inhabitants, which still exists in relation to infrastructure.
- The ongoing effects of the Apartheid education system and the failures of the OBE secondary education system that replaced it.

Where South Africa has succeeded in embracing the digital age is in the development of a

state of the art cellular or mobile communications network. The capital investment around the 2010 Soccer World Cup has accelerated the construction of this infrastructure. The ubiquitous nature of the technology could hold one of the keys to bridging the digital divide for the broader community. The falling cost factor both in hardware and connectivity is bound to increase the reach of these media and represent an opportunity for the roll-out of audio and video mobile learning solutions.

These issues are not unique to South Africa as other countries have also experienced them – for example, Australia has experienced exponential growth in student numbers and diversity recently; the universities there used online and IS methods to overcome some of the associated difficulties. In the process of developing these solutions, these institutions have also positioned themselves to take advantage of the growth in demand for English medium tertiary education that has developed in Asia as a consequence of increased wealth, created by the adoption of a state controlled capitalism by China among other things, on the subcontinent. However, as the institutions cannot absorb the numbers of potential students on campus, the technological solutions allow them to service this growing market. Ron Oliver of Edith Cowan University identified four areas in which the university has to achieve excellence to make the move to effective online teaching and everything associated with it: “the establishment of cost-effective practices; the achievement and maintenance of quality in online learning delivery; ensuring access and equity in the delivery of programs; and establishing practices which can enable online learning to be sustained and to grow as a mainstream activity in university teaching and learning” (Oliver, 2001, pp 223). It is the third item on that list that is of particular interest at this juncture and was further broken down into Technology skills, Access to Technology, Technology literacy and Self-regulated learning. It is obvious that the last item on this list can only be successfully achieved if the first three have been dealt with. In the South African context the experience of the researcher has been that the existence of ubiquitous computing is in actual fact an impediment to the achievement of both skills and literacy in the IS (Information Systems) sense. This implies that, even if the university places at the disposal of its students all the hardware and opportunities they require, and at the same time it ignores their level of technical skill (or it makes assumptions about

said skill level based on time on campus, access to high tech equipment like cell phones etc.) technical innovation will have difficulty penetrating this artificially created environmental barrier. These issues are further complicated by the sheer rate of technological development, in the words of Warschauer: "technology is developing so rapidly that it can often be difficult or even overwhelming to harness, somewhat like trying to get a drink of water from a gushing fire hydrant" (Warschauer, 1995), and that was 15 years ago. According to Moore's Law (Australian Academy of Science, 2000), the number of transistors in a processor doubles every 18 months, and with that the sophistication of the applications it can run. At the time that this was written MP3 encoding had just been invented (1991) but there were still years to go before the first portable player was developed - much less the possibilities inherent in the technology called podcasting.

In the South African context, it is also incumbent on the tertiary education institutions to produce graduates that can fulfill an increasingly critical role in society due to the ever-increasing skills shortage (Fields, 2000). In the light of this, it is essential that the graduates who enter the marketplace have the skills required to perform. In 2009 Higher Education South Africa (HESA) released a study entitled "Graduate Attributes: a baseline study of South African Graduates from the Perspective of Employers" authored by Hanlie Griesel and Ben Parker. The study reported that in the category; basic skills and understanding, the most valued graduate attribute is "communicative competence in English." Included in this are the "tools, concepts and strategies" which are used to demonstrate these skills. In most countries these issues are addressed and the foundations for these skills are laid in the schooling system. "Digital communication is a foundation skill for most careers today, as most people will be involved in some form of conceptualizing, producing, delivering, and receiving such communications in their jobs and lives" (Ortiz, 2007). In South Africa, however, universities have to address the failures of the primary and secondary education system. "In terms of all basic skills -- including numeracy, the ability to use new information and computer literacy -- employers said they generally get less than what they expect.....South African graduates do not have the competence in spoken and written English or the oral presentation skills required by employers" (Pretorius, 2009). In addition to these skills, to

compete in the international graduate arena, cyber skills are taken as a given, and these depend on access.

What is critical to keep in mind is the importance of Internet access to the performance of a tertiary education institution and by extension its student body. The U.S. News and World Report (<http://www.usnews.com>) produces an annual listing of the United States' top universities based on a number of characteristics. While there is some debate and controversy around the ranking of the output, the top schools are generally accepted. What is interesting is that as part of the ranking process U.S. News compiles statistics on the computer and Internet availability to students. Of the top 125 schools, every school provides Internet and email access to all students. While there is some debate around definitions of access and availability the fact remains that high quality tertiary education and access are related in the United States. While correlation is by no means the same as causation, the availability of these resources to all students would assist tertiary education institutions in attaining what Harvard University (highly ranked across all the various measuring instruments) president emeritus Derek Bok (2006) considers outcome quality; that students should "write better, speak more eloquently, think more rigorously, or reason quantitatively more proficiently". "Bok seems to think that these kinds of outcomes can be measured and that technology can assist not only in helping students attain these skills and knowledge but also in their measurement" (Capshaw, 2008). One of the interesting items that Capshaw highlights in his research is that there is a 4 - 7 year lag between the U.S. and less developed nations regarding Internet adoption. What the analysis does not highlight; is the fact that based on the incredible pace of technological development, the implication is that the lag might even be in the less developed nations' favour. Overall in relation to tertiary institutions the results do indicate that the gap that had existed is being closed rapidly. While debate rages on about what constitutes quality due to definitional and measurement issues;

"it is increasingly likely that such technologies will, at a minimum extend access to higher education to a wider range of students and through the ability of the Internet and computer technologies to provide access to greater amounts of information, it will

enable low- to middle-income country institutions to pass this greater content knowledge along to their students, whether through traditional rote methods or by transitioning to the more critical thinking, constructivist model now used in high-income countries” (Capshaw, 2008).

The cost related issues were the fundamental reason for the whole academic and political debate surrounding the concept of the “digital divide” (Compaigne, 2001). Within the present South African context, with the ever-deepening skills shortage and the still-entrenched educational discrepancies brought about by the Apartheid regime, these in turn arguably being exacerbated by the present failures in the education system (MacGregor, 2009), the ability to reach beyond the fence of the campus, both to existing students and the community at large is a matter of great importance and certainly worthy of local debate. The following section focuses on Podcasting’s ability to assist in this regard.

3.5 Podcasting and off-campus students

Bonk and Zhang (2006) have included podcasting as an essential component in their R2D2 (read, reflect, display and do) model developed for the delivery of distance education to Generation X and Generation Y business students. Gen X is typified as follows; “they are individualistic and technologically adept, flexible in the workplace and value a life/work balance. Generation Y are Tech Savvy, meaning they use technology as a first port call when faced with a challenge – ‘google it’ - in addition they value team effort more than the individualistic Gen X’s” (Kane, 2011). The introduction of the model was brought about by the high levels of drop-off encountered by these students in distance education business courses. Bonk and Zhang maintain that the nature of the student’s history with technology requires a shift in focus from the more passive textbook and infrequent lecture-based type education used in distance education to date; their model focuses on the last ‘D’ of R2D2. Their model relies on a more interactive Web2.0 based social networking type system. It allows students to interact with each other and the content in a real-time manner not permitted in the past due to bandwidth and software limitations. Podcasts are a cornerstone of this

methodology as they are the means of delivering the formal content of the course via lectures, virtual tours, animations and concept maps. They are also a way, via recorded videoconferencing, for students to communicate with staff and each other. The objective is to provide a more engaging and dynamic teaching and learning online environment for learners. This will hopefully address those issues that have been responsible for the high drop-off rate noted above (Bonk & Zhang, 2006).

Part-time and distance students may also benefit greatly from the availability of recorded lectures. Again this relates to the ability of the technology to reach beyond the gates and the perforce rigid scheduling of the university. Often these students are employed and need to optimize their time usage, which requires multitasking. A good example of this is the University of Sheffield, which uses podcasts to communicate updates related to changes in the law to their graduate students working as article clerks (Harris & Park, 2008).

Any discussion that involves distance learning needs to cover the demand for international learning e.g. foreign students using domestic tertiary institutions. At present the major driving force behind the growth in this sector is in Asia. “Rapid economic growth in the Asia-Pacific rim, particularly China, India and Pakistan, represent enormous opportunities for delivering education” (Blight, 1995). It is apparent that Blight’s insight was accurate as can be seen by the following: The BBC reports that the final figures for the number of internationally mobile students in 2009 – which will be released by the UNESCO Institute for Statistics in May 2011 – are expected to show the number students rising to 3.43 million from 2.96 million in 2008. There has been a significant increase over the past decade, with the global number of mobile students rising by more than 75% since 2000 (UNSECO IS, 2011). This represents current demand, which defies the trend anticipated as a result of the Global Financial Crises – therefore the interest in what is happening with Web 2.0 and education. The East cannot supply enough capacity to meet the demand (mostly driven by increased wealth and associated status-driven demand) and the West is reaching the edge of its elastic limits as well. In addition, it becomes politically difficult to justify providing education to foreign students when the tax-paying public who fund the institutions cannot place

their own children. Therefore, it becomes incumbent upon providers to assess the use of alternative ways of addressing this demand. Technology is certainly one of the options open to institutions that wish to benefit from this development. Within that market, the use of Podcasting will no doubt form a cornerstone (Hosie & Mazzarol, 1999).

The use of satellite communication is another option as long as a footprint is shared and this is certainly the case with Sub-Saharan Africa for South African institutions, however, satellite time is costly. The extension of the SEACOM cable into the West African coast makes access to pre-recorded material in the form of podcasts more financially viable. An important issue here for the more conservative and traditional institutions is the rapid adoption of technological solutions from within the private sector. These organisations have no problems with embracing technology to reach as yet untapped markets – to date Africa has not been a viable target as these organisations are revenue driven; however, as the market becomes increasingly sophisticated and connected they will move in with their virtual classrooms and the multimedia Web 2.0 applications that will provide substitutes for, rather than be complements to, traditional classrooms. This trend is already well advanced in Malaysia and other parts of Asia. “Corporations have identified an investment market which electronic technology will popularise further on an international scale. If traditional business education providers do not respond to the opportunities offered by IT, the corporate sector is likely to set the agenda. In the process, *the foundations of mass education will shudder*” (Hosie & Mazzarol, 1999). In addition to the above, a new model of academic publishing is finding a foothold in the web; free textbooks, that carry advertising and use a pay per download model to remunerate writers, is experiencing exponential growth in titles, the latest additions to the service are associated vodcasts (bookboon.com, 2009).

3.6 Cognitive learning theory and mobile-learning

“Most pedagogical theories fail to encapsulate the unique qualities of mobile learning (m-learning). This is because they are theories of teaching, centred around the assumption that learning occurs in a classroom environment, mediated by a trained instructor” (Evuleocha & Ugbah, 2007).

In addition, a significant number of theories are based on objectivism, in which a nominalistic view of knowledge is held. “Knowledge therefore exists independently of any human experience and the role of the learner is to acquire it. Objectivists focus on defining learning objectives and implicitly assume that the learner is an empty vessel, to be filled by the instructor” (Philips, 1998). Objectivism can be considered to be applicable when dealing with the introduction of new concepts; however, at a tertiary level the outcomes that are required are of a more cognitive nature, the desired outputs being individuals who can perform critical analysis and actively engage the topics under discussion from a broad knowledge base, in an attempt to produce new knowledge and insights. In this context objectivism is lacking, and the implied assumption of passivity on the part of the learner is possibly less than ideal. That being said, any discussion of tertiary teaching and learning requires a framework that discusses the theory of cognitive learning. This author chose to focus on the ways in which learners establish a relationship between themselves and the knowledge that they are attempting to acquire and integrate into their personal conceptual framework: e.g. knowledge production as the creation of mental models. These models are considered essential for personal knowledge ownership. For the purposes of this research the researcher will rely on the tenets of radical constructivism, which is in turn based on the tenets of cognitive science. The receiver of information is seen as an active participant in the information transfer process and as such ‘filters’ information based on prior knowledge and experience, hence making it unique to the user. Therefore, knowledge per se, is constructed, rather than discovered. The radical constructivist movement maintains that these models are entirely unique to each individual. In addition: “The emerging constructivist theories underlined that information is not a pill an individual can swallow in order to become informed, but a plastic substance that can be shaped in many ways. An information user is not a passive information processing system but actively makes sense of the surrounding reality and attaches personal meanings to information” (Talja, 2005). A lot of the work done perfecting the models used in Information Systems focussed on individual search behaviour related to data retrieval and similar behaviours. This is not strictly relevant to the present research as students were provided with the material. However, the underlying concept of the construction of models remains topical. A criticism of constructivism

that remains valid in this context however is the assumption that language, e.g. the means of knowledge transfer, is neutral. It can be argued that this research and the use of the podcasts by students potentially addresses this criticism in the sense that the multiple uses of the material should permit the user to overcome any biases introduced due to initial language barriers (Talja, 2005). Podcasting, in the present context i.e. as an addendum to formal lectures, fits within the framework of radical constructivism as it serves as a unique or personalised method of revision - e.g. controlled by the individual to match their learning needs and individual pace - which assists the student in the creation of the cognitive structures that form the basis of long term memory and hence usable knowledge. The theory also incorporates the behavioural and flexible element inherent in the use of this type of device. The learning takes place in a “real world” environment and it allows the user to contextualise it and even debate issues in real time with their classmates, either face to face or via social media such as Facebook or MixIt. However, once all these actions and interactions have taken place the model of the information and how it is incorporated into the totality, still remains unique to the individual.

Insofar as the education experts have assessed the potential of e-learning, they have focussed on constructivism as opposed to radical constructivism as the principal philosophical underpinning. It should be noted however, that this is more directed at the development of interactive multimedia applications with multiple participants and real-time feedback systems, an order of magnitude more complex than the current study, this author maintains that the radical model suffices in the present context.

Moving away from the strictly theoretical, some of Warschauer’s research on the other hand, has focussed on the applications that the technological innovations can be put to; he has written books and scholarly articles on how online technologies can assist second language learners. He is also well known for his contributions on how participation in digital media can be used to overcome the marginalisation of culturally and linguistically diverse learners (Warschauer, 2000). Certainly his insights are relevant to research into the adoption of ICT (Information and Communications Technology) innovation in the South African educational milieu. These issues

would have an impact on the adoption of new technologies and could explain some of the biases identified within the pilot study. This also impacts on the question of behaviour changes (both on the part of the researcher and selected participants) activated by the introduction of the technology. This in turn serves to validate the choice of an action research model as the basis of this study, which will be expanded upon in the section on research methodology. Prior to that however, it is necessary to define the problem statement.

4. Problem Statement

With the commencement of the first iteration of this research project, it was unknown if correlations existed between access to podcasts and changed performance at a tertiary level for first year, first time, as well as repeat students in Economics in a South African context. It was suggested that the high failure rate experienced in the subject at UKZN was related to a number of problems: overcoming artificial barriers created for students due to unequal access to schooling resources, a lack of contextual information, language and associated comprehension problems, educational ‘culture shock’ and the possible impact of ‘edutainment’ on student expectations. It was proposed that research be done to ascertain if there was a relationship between access to podcasts (used as self-regulated revision/tuition support) and academic performance.

Could using podcasts impact on the effects of the lack of proper resources (textbooks, qualified feeder subject teachers, teaching aids etc.) in secondary schools, especially those that serve the rural and peri-urban previously disadvantaged communities? The author proposed that these issues contributed to a lack of prior knowledge to act as a “hook” to hang new information on. Podcasting could conceivably provide the additional background or “scaffolding” (Jamie, Chang, & Wang, 2009) to contextualise the formal content of a course without eating into face-to-face instruction and demonstration time: a limited and valuable resource.

First time, first year students have limited exposure to the content and methodology of Economics as it is presented at a tertiary level, thereby creating cognitive difficulties with

contextualising concepts and integrating them into the student's existing reality or mind construct (Gestalt). Could podcasting be a time and cost-effective method to help students address this issue?

Related to the above is the existence of a language barrier that complicates comprehension amongst culturally diverse students. The effect of this is the creation of artificial barriers to progression that could be addressed by providing tuition methods that incorporate more repetition and demonstration, providing students with the opportunity to grasp concepts at a pace that suits their individual learning needs. From the institutional perspective, in the past this has been done via the use of tutorials; however the 'massification' of student numbers and a lack of resources has made this impossible in the current scenario.

From the student perspective, first year, first time students have to adapt to a very different pedagogic environment, partially as a consequence of a lack of resources at a tertiary level. As a result of this, the lecturer/student ratio is very different to what they are used to at secondary school and hence the instruction methodology differs significantly. This results in limited face-to-face contact and a relative lack of ongoing assessment requiring a different learning strategy on the part of the student. Cognitive learning, it is theorised, is based on repetition, comprehension and integration with existing constructs prior to establishing long-term memory. According to the tenets of radical constructivism this process is unique to each individual. The combination of high student numbers and limited instruction time complicates this process. Podcasts may provide the necessary flexibility to meet these individual needs.

The sample population had been exposed to "edutainment" as a part of their lives in South Africa. The SABC (South African Broadcasting Corporation) provides educational programming using this method, both on Television and Radio channels, in addition to this a number of regional radio stations play host to life skills and educational programming. These media reach the entire SA population according to the annual All Media Product Survey (AMPS). Those students from the middle- or more wealthy classes were also the first generation of tertiary students to have fairly easy and relatively affordable access to broadband along with its associated social networking facilities such as Facebook, MixIt, Twitter and YouTube. In addition, they have access to (limited)

WiFi hotspots, more extensive wireless data networks via the cellular 3G and HSDPA infrastructure, all supporting social networking applications such as MixIt, which provides a mobile platform for real-time social interaction. In a South African context this generation of students is the first one to take this connectivity for granted. The question that this begs is should tertiary institutions adopt the podcasting mode of delivery as an addendum to formal instruction, and will it have an impact on the performance of students? Video podcasts (vodcasts) by their nature have the potential to fulfil this role – they are in effect the basis of YouTube, and hence have synergy with the other applications managing the multitasking existence of the twenty-first century tertiary student.

This author also encountered a host of potential issues that focus on the ability of the members of the data universe to actually utilise the materials. The primary reason for launching the study in the second semester of both years was to provide the new intake of students with an opportunity to come to grips with campus technology. This concern revolved around especially the previously disadvantaged students who may not have had access to ICT technology at a secondary level. In addition to this, the development of “ubiquitous computing” implies that people use equipment without understanding how it works. This in turn implies not being able to operate outside of their usual usage paradigm (e.g. an inability to use software other than the software they are used to, or to actively surf to a website, download and access files, as opposed to relying on automated embedded systems that perform these functions seamlessly with minimal user intervention as per “ringtone downloads” for cellular telephones). This author found it helpful to do live demonstrations of how to access the files in class. Fortunately UKZN has started the roll-out of the wireless campus and the venue that was used for the class had an active Access Point. This combined with the use of data projectors, allowed the author to demonstrate the entire process in real time to the students. Research in the developed world has not considered these issues as the average tertiary student in those countries has had several years of exposure to ICT and extremely cheap and generally uncapped broadband, both at school and in the home, by the time they enter university (Chan & Lee, 2003).

To complicate matters further, South Africa is in a unique position due to the duality of the environment, combining cutting edge infrastructure in for instance cellular communications, with a population that is still largely poverty stricken and has a very low level of functional literacy, and by extension computer literacy, as compared with the developed world. The much-discussed failure of the education system at primary and secondary level serves to further constrain these people's opportunities. Obviously, while they may have had a profound (if immeasurable) impact on results, finding solutions for these issues lies beyond the scope of this research, but may well indicate future directions and topics for other researchers.

Certainly, the ability to effectively use technology in a flexible and problem-solving manner is a very important factor in South Africa's ability to compete internationally. The development of multi-media products for education and the availability of those products on the Internet have the potential for profound implications for the quality of education, as well as the duration of the impact of the digital divide.

4.1 Research Objectives

- To determine if podcasting as an addendum to lectures could impact on first time first year and repeating Economics students' results.
- To critically evaluate the possibility of implementing the delivery method across the entire first year syllabus.
- To determine if the availability of podcasts assisted students to contextualise and assimilate learning objectives to a degree that impacted on their performance.
- To assess if access to a more flexible mode of delivery that matches the unique needs of students in terms of availability, focus, pace of instruction and repetition had an effect on progression in Economics 1.
- To determine if access to podcasts contributed to overcoming the barriers potentially faced by culturally diverse students.

- To determine if the similarity of podcasting to social networking and edutainment implied that it would be a success as a tool for formal instruction at a tertiary level.
- To determine if a digital divide exists amongst first time, first year students.
- To ascertain if the literature on the digital divide and multi-media experience with regards to adoption rate and access for students in developed countries is relevant to the selected sample in UKZN.

4.2 Research Questions

The primary question addressed was: will access to podcasts have a statistically significant impact on the results of first year students in Economics at UKZN Westville? This breaks down into 5 sub questions:

1. Could podcasts meet the requirements of radical constructivism as a mode of delivery within the context of this study?
2. Do podcasts assist students to overcome the barriers to learning implied by cultural diversity?
3. Should tertiary institutions adopt this mode of delivery as an addendum to formal instruction?
4. Did the utilisation of the technology indicate differentials between UKZN student adoption of podcasting as a mode of delivery and that experienced in the developed world?
5. Did the sample of respondents indicate the existence of a digital divide in the UKZN student population?

4.3 Importance/Significance of the Study

Deal highlighted that as far as research into podcasting went “no studies to date have shown

evidence of any effect, positive or negative, on learning outcomes. Some critics point to this disconnect between students' perceptions and reality as evidence that students might overestimate the usefulness of reviewing recorded lectures—possibly drawing them away from more effective study strategies” (Deal, 2007).

The results of this research represent the first scientifically based attempt to measure the effectiveness of the podcasting mode of delivery to Economics students in an English medium South African university. According to Apple Corporation, UKZN is the early adopter of Apple podcasting technology in South Africa. Should the results of the research indicate that there is a positive correlation between the availability of the podcasts and student progression, the implications of this for South African schools of Economics is considerable. The discipline is notorious as a brake on student progression and hence the institution's ability to collect its subsidy for the relevant student, this is highlighted by comparing and repetition rates for Economics (+ 19%) and other first year subjects such as Management Studies (< 5%). On a macro scale this will assist in the alleviation of a very serious and universal issue faced by all domestic tertiary institutions - increased student numbers combined with high repetition rates vs. limited resources.

The issue of rapid progression is further complicated by the proliferation of majors offered by universities in the Business and Social Sciences - Economics has a high incidence of crossover attendance from the two directions of study - and this impacts on the availability of timetabling and hence face-to-face interaction. On the UKZN Westville campus, there are literally not enough physical venues, even if there were enough staff, to be able to deliver tutorials to the entire first year tranche of students. Should podcasts prove to be a viable mode of instruction support, it implies that the discipline of Economics and potentially the other business sciences, have a tool that allows them to reach beyond the campus gates and core teaching hours in a cost effective fashion. This additionally has obvious implications for all distance-learning programmes, which by their nature lack contact time. From the perspective of ICT, the study has demonstrated that the technology has scope beyond the IT disciplines and entertainment and has highlighted how

embracing innovation in the ICT field can be beneficial to many academic endeavours in a South African context.

The research also set out to highlight that the negative perceptions associated with technological innovation in tertiary education amongst academics are just that – perceptions. Will the availability of these types of interventions have a dramatic impact on student behaviour in terms of lecture attendance? Alternatively, it may be found to have a dramatic impact on student success, especially as it relates to those students with language and mathematical preparedness issues. “Many existing educational uses of podcasting focus on the use of the technology to deliver instructional content such as lectures, which can lead to questions of pedagogical soundness and risk adversely affecting class attendance. Used appropriately, however, podcasting can enhance classroom learning by encouraging students to engage with the material and adding yet another modality of learning” (Chan, Lee, & McLoughlin, 2006). This in turn has major implications for students that fall in the designated groups of the previously disadvantaged, as it can serve to highlight the fact that there is very little difference in behaviour and the willingness to embrace technology between South African tertiary students and students in the developed world, when provided with a level playing field. This has significant implications when it comes to introducing technology into the South African tertiary milieu and adapting existing solutions from the developed nations, e.g. benefitting from the investments made and research done. These insights may accelerate the introduction of solutions that will benefit South African students.

5. Research Design and Methodology

The nature of the research is such that it requires an adaptive research model. In this research the author has chosen to adopt an action research methodology with a proof of concept pilot study as the research strategy, while using a positivist paradigm as the basis for analysing data. Within an IS framework, an action research based intervention has been described as follows: “Action research embodies a strategy for studying change in organizations. It involves the formulation of a theory, intervention and action-taking in order to introduce change into the study subject, and

analysis of the ensuing change behaviour of the study subject” (Baskerville & Pries-Heje, 1999).

The reasoning underpinning the choice of action research relates to a twofold set of influences. The introduction of the podcasting material was bound to be accompanied by a learning effect – on both the researcher and the student’s part; in addition the rapid development of the technology, both hardware and software was going to have an impact. At the outset of the first iteration it was known to the author that a dedicated podcast server was going to be brought online. The exact timeframe of that installation was unknown at the time and the author felt that a pilot study would be beneficial to identify teething problems. The action research model has the inherent flexibility to account for these effects through the various iterations of the research; due to its multivariate nature it lends itself to research that focuses on paradigm shifts. One of the most quoted and used definitions of action research is that of Rapoport’s: “Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework” as quoted in (Baskerville & Wood-Harper, 1996). The definition highlights the collaborative and interactive nature of the research, ideal for analysing a field developing as rapidly as the numerous applications developed in the digital milieu, while highlighting the fact that the objective of research is to expand upon the stock of knowledge of social science.

“Action research is especially important in situations where participation and organizational change processes are necessary” (Baskerville & Wood-Harper, 1996). While it is debatable whether the introduction of podcasting qualifies as a ‘necessary’ organizational change within a tertiary environment such as UKZN on the macro level, the author would argue that it certainly qualifies on the micro level as it relates to the affected students and lecturers.

In addition, the use of repeated iterations adapted from what has been gleaned in the previous cycle of research, makes the method uniquely suited to investigating the effects of technologies such as podcasting, which includes an adaptive behavioural element. “While there are valid positivist criticisms of the methodology, its flexibility, when applied to unique learning

experiences and adaptive behaviours” (Baskerville & Wood-Harper, 1996), more than compensates for these shortfalls in this cycle of studies.

The main positivist criticism revolves around the identical replication of research studies to test the veracity of results. When looking at fields such as physics and chemistry these issues are critical for obvious reasons. However, when you are dealing with humans and an adaptive environment with learning effects, these types of issues become problematic to say the least. Heraclitus of Ephesus (c. 535 – c. 475 BCE) famously remarked that “you cannot step into the same river twice”. It can be argued that treating humans as inanimate objects, subjecting them to specific stimuli and then measuring their responses, is morally abhorant, calling to question the philosophical underpinnings of positivism in the Social Sciences. In addition, the environment has an impact on the research subjects, therefore affecting their level of sophistication in relation to the use of technology. It is conceivable that you could match the samples used perfectly, in terms of demographics and secondary school that they were drawn from, and get entirely different results; due to the fact that between samples the school had installed a computer laboratory for the first time. In addition to the above the positivist approach would also require that the research be conducted using the same methodology and tools to test for replication of results. In an environment such as ICT this would have the effect of preventing research subjects from benefitting from the introduction of new technology, which could impact on the success of the research from their perspective, certainly in the case of this study that would have been the case. In addition to the subjects, the researcher would also have been disadvantaged as the introduction of new technology allowed greater flexibility regarding content and delivery, while at the same time making the production process significantly more efficient. In addition to the purely methodological questions around action research there are also issues regarding ethical dilemmas which arise from its collaborative nature. Within this study these issues are minimised due to the fact that “collaboration” (if the term is relevant in this context) was limited to one demonstration lecture, beyond which the students had minimal interaction with the researcher regarding the podcasts.

When doing research of this nature it is incumbent on the researcher to take cognisance of the existing relevant theoretical constructs in the field of study. Harris and Park investigated the increasing use of podcasting in universities in the UK over the period 2006 – 2007 (Harris & Park, 2008). Their research led them to the construction of a model of usage; they broke the usage into 4 broad categories; ‘teaching-driven’, ‘marketing-driven’, ‘service driven’ and ‘technology-driven’. Regarding the current research, the first category is the most relevant, and was represented by the table below:

Podcasting usage characteristics	Podcasting usages	Model summary
Teaching-driven	Augmented teaching	Repeating/summarising lecture *
		Providing additional lecture content *
		Providing seminar/public seminar
		Providing up-to-date academic material *
		University key personnel interview
	Student assignment	Part of coursework
	Student research	Presenting research paper

Table 1 - Podcasting Categories

Source: Harris & Park, (2008)

* Represents how the current research utilised podcasts.

This author used the Harris and Park model to provide direction when developing the podcasts for both iterations of the research. Harris and Park summarised the teaching applications of podcasts as follow: lecturers see podcasting as a means of ‘face-to-face’ communication that goes beyond the limits imposed by a timetable and venue allocation structure. The technology allows lecturers to direct students at critical issues in the syllabus by emphasizing specific topics. Students on the other hand, benefit as it satisfies individual needs of ‘knowledge ownership’. “The flexibility and affordability of podcasting cater to diverse student’s needs by enabling repeated learning and offering an opportunity for the effective use of time” (Harris & Park, 2008). Once the underlying paradigm of positivism and the action research strategy had been decided upon, it became incumbent on the researcher to operationalise the project and produce the material required

within the parameters of the constructs.

Podcasts were created off-line in the first iteration using a technology built-in to the Apple architecture, Garageband®, while the second iteration relied on Apple's Podcast Producer®, hosted on a dedicated Apple™ server on the Westville campus of UKZN. While offline podcasts have the advantage of being “perfect”, they lack the spontaneity of the “live” recording and additionally do not have the potential for student input.

The content of the podcasts in both iterations focused on so-called “Initial Knowledge” materials. These include facts based on data published internationally regarding matters such as GDP, GDP per capita, the various types of unemployment, and why South Africa is unique in this regard. The podcasts also included discussions on economic growth and its drivers, productivity, various macroeconomic definitions, the rules of discourse, mathematical tools of analysis and the inter-connectedness of issues within the discipline of macroeconomics. The research tests the theory that these interventions assist the students in the development of the basic skills and vocabulary that they require to perform the analytical tasks required of them at this level of study. This in turn, is then reflected in the results they attain when compared with previous tranches of similarly skilled (according to NSC exam results) students of Economics without the podcast support.

The research conducted was done in 3 tranches. Initially, the research project focussed on the use of podcasts by the ECON102 group of 2008. This served as the pilot study. The intention was to use a quantitative approach using student results from within the school of Economics and Finance, University of KwaZulu Natal, Westville campus. The results achieved for the relevant first year course utilising the same syllabus between 2005 and 2008 would provide the baseline for analysis – this provided approximately 2800 observations to be analysed. The experimental sample was to be those students who responded via email that they had utilised the podcasts that were made available covering the first part of the course (up to the first test – to provide a distinct sample with associated results). The students were to supply a diary of usage. Once the research

had been collected the sample was found to contain no members of the B.Com4 group, those members of the sample the researcher was most interested in assessing.

The research timeline was furthermore determined by the availability of the final results of first year Macroeconomics students that had used the podcasts developed by the researcher in the UKZN School of Economics and Finance during the mid-year breaks in 2008 and 2009.

The selection of first year students as the focus of the study was driven by past research and discussions on multi-media and pedagogic theory. These research results indicate that the method of delivery should be determined by the nature of the learning objectives of the course (Oliver and Herrington, 2001). In light of the fact that the introductory section of the vast majority of university Economics courses is fairly structured, due to the nature of the subject and its basis in graphical and statistical methods of analysis and representation, it was felt that this group would benefit most from structured one-way communication.

The sample results were correlated with results of first time, first year students from previous years (2005 to 2007) as well as non-respondents from the 2008 group within the school. In addition the results were assessed for internal consistency with results achieved in different parts of the Macro Economics syllabus (without supporting podcast episodes) by the same population of students. Observations between 2005 and 2007 (inclusive) were subjected to a correlation analysis between test results and final exam results within a section (ECON102 Examples: 2006: 0.929, $\eta = 837$; 2007: 0.915, $\eta = 705$) as well as the relationship between results achieved in Micro Economics in the first semester and Macro Economics in the second semester (ECON102 Examples: 2006: 0.803, $\eta = 837$; 2007: 0.774, $\eta = 705$). Consequently for the total class, the marks within a semester called Duly Performed (DP) marks based on tests written during the semester in question are a better predictor of performance than those between semesters.

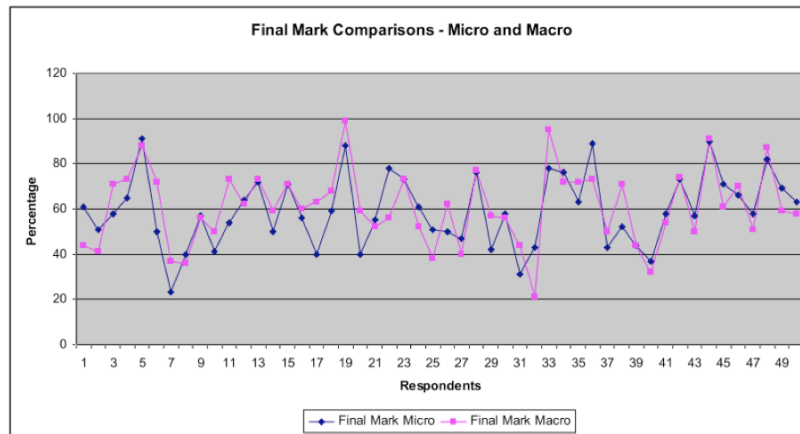


Figure 2 - Final Mark Comparison - random sample ECON102 - 2006

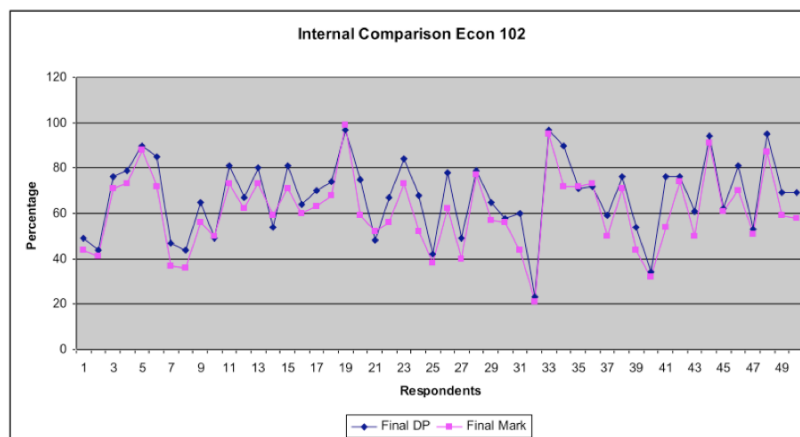


Figure 3 - DP vs. Final Mark Comparison - random sample - ECON102 - 2007

Source: UKZN School of Economics and Finance 2008

The author collected the voluntary responses (in the form of diaries of usage and results achieved) and while the overall sample (including repeating students) was large enough to be statistically significant from a purely mathematical perspective, it was felt that the nature of the overall data universe in terms of sample size and demographic spread was not sufficiently represented. This was reinforced by the lack of a single participant from the so-called B.Com4 group (Augmented Economics) who represented the demographic the researcher was most interested in. These were also the students who had all received the headsets handed out at the start of the semester. In addition, the method of instruction e.g. a number of groups independently taught by different lecturers using unique materials developed by the individual lecturers for the syllabus content, was felt to present an obstacle in terms of uncontrolled variables. Nonetheless, a

number of very critical issues were highlighted which would be used to improve the next iteration of the research.

These issues were among others:

- To encourage the use of the podcasts in the 2008 research and to try to level the playing field in terms of access to resources, 400 sets of headphones were handed out to students at the start of the semester, 120 to the Augmented Economics group – predominantly from rural previously disadvantaged backgrounds, and the balance on a ‘first come, first served’ basis to the rest of the Economics 1 class. The feedback received in terms of active participation indicated that this had very little impact on actual use of the podcasts. The author is of the opinion that this was mostly due to problems with accessing the information (see below) rather than the lack of usefulness of the hardware.
- Supplying headphones to the students was a waste of resources – the majority tried to use them for music and then disposed of them due to the low quality. It should be noted, however, that the low quality products were fine for the application and as such circumvents any argument on the part of the student that they are expensive – they retail for less than the price of a packet of cigarettes. However, that being said, supplying a complete playback unit along the lines of an iPod as per research done in Duke University in the U.S. (2005) would almost certainly overcome this type of issue. The problems regarding that would be related to resources and logistics. The Duke project had a budget of US\$ 500 000.00, roughly R 5 Million. Papers published indicate difficulties with recalling the devices at the end of the semester.
- Using Garageband® as the tool to produce the ‘enhanced’ (in this instance inserting jpeg images of overhead slides into the audio stream) podcasts was extremely labour intensive with a 10:1 ratio of production time versus the duration of the final finished product.

- Garageband® was limited in the sense that it is not possible to animate the images related to the soundtrack and while the students indicated that the podcasts were useful, the author found this feature (or rather lack thereof) to be limiting in the Economics domain.
- Using the Garageband® feature of providing a background soundtrack was wasted effort as most of the devices that the files were played back on could not reproduce the sound due to quality issues.
- The Mac Mini used had a limited Hard Drive capacity (40 Gigabytes) and this impacted on the machine's ability to deliver a finished product. Prior to compression the files were about 7 – 9 Gigabytes in size. This required constant burning to CD ROM to ensure a recovery file; obviously the working files were too big to save to a CD ROM, another limiting factor of the model used was it only burned CD ROM's.
- Using an actual lecture as the basis for a podcast was a mistake – the 45 minute length of the lecture was onerous for the students – especially when they were using the podcast to access a particular piece of information. However, the fact that the slides were synched with the audio presentation meant that it was possible to do so. This was however difficult on a cellphone screen due to pixilation of the images.
- The lack of RSS (Real Simple Syndication) technology, which allowed students to subscribe to a data stream, was a major issue. Due to the lack of a dedicated podcast server at the time, the author was granted space on the School of IS&T's website to host the podcasts and support material such as the diary spreadsheet and the Quicktime® Player software required to play the completed podcasts on a computer. It was assumed that due to the fact that the students would have experienced one semester of using the Information Technology infrastructure at UKZN they would have no problem accessing the information. As it turned out this was an unrealistic assumption. Most students had the required skills to take advantage of ubiquitous computing such as ringtone and wallpaper downloads to their cell phones; however,

amongst a significant proportion of the first year group there was a lack of experience with computers beyond basic operations. The research had encountered the digital divide, and it resembled the Marianas Trench. The consequence of this miscalculation was that a significant number of students gave up trying to access the information – unfortunately they kept this to themselves and while the author received feedback from active users regarding access issues etc. the non users did not report the difficulties they were experiencing, possibly due to being embarrassed as a result of their lack of knowledge. This information only came to light in informal discussions with students after the semester had run its course.

- The material was put through a number of different conversion software packages so that it was available in formats compatible with the major brands of Smartphones in the SA market at the time. This encouraged students with access to these devices to use the material (which they did based on responses received – see below) but it obviously was biased in favour of those students who came from a more affluent background.
- At the end of the first iteration of the research only 37 students responded, a number without submitting diaries, and of this group a number were repeat students. It was later indicated to the author that a number of students did not know how to use a spreadsheet program, nor how to save it and email it. Doubtless a number of students just chose not to use the diary at all or used the material and could not be bothered to use the diary provided, irrespective of numerous requests for feedback both via email and personal appeals made in lectures by the researcher. The number of ‘hits’ recorded on the webpage that the material was stored on (in excess of 400) would seem to indicate this. It is, however, impossible to identify how many were unique ‘hits’ due to the fact that in the light of ease of use and concern about the effects of a possible ‘digital divide’ it was decided not to have a secure site with unique log-ins.

- The possibility that the effect of the “classical” digital divide had an impact on utilisation of the podcasts by the students from previously disadvantaged communities was to be assessed by separating out the Economics 106 group (the so-called Augmented Economics tranche of students) for separate analysis in terms of representivity. Unfortunately, even with the supply of free headsets to all members of this group, they were not in the sample of respondents. It is theorised that this was as a result of the existence of the “classical” digital divide. The lack of feedback from non-users served to exacerbate this situation, and was definitely a failure in the original research design. With hindsight, the sample population was too large and diverse to be effectively managed as a sample. In addition, there were more uncontrolled variables *post hoc* than what the author had tried to account for in the original research design.

Below is a list of some of the unsolicited responses received from students:

- “They were of an excellent help to me and I sincerely believe that it shall be noticed by the improvement in my marks” (First Time, First Year)
- “I have used the podcats and yes they are very helpful” (Repeating Student)
- “Hi I am a repeating student doing economics. I found that viewing the podcasts was very helpful during my preparations for test 1, and my results prove that point. Is there going to be any podcasts for part 2? I am hoping so) Thanks for assisting in our studies...” (Repeating Student)
- “Hey, I just want to say a big thank you! For the podcasts I found them to be really helpful, Thanks Again!!!” (Repeating Student)
- “...thanks a lot it was really helpful, oh and i downloaded it on my phone.” (First Time, First Year)
- “Sorry for replying so late, I had problems with my e-mail settings. anyway the podcasts were fabulous. I passed with flying colours. Please do not stop them cause they are so helpful. Thank you so much. (First Time, First Year)
- “The podcasts rock Economics. I found podcasts very useful since it me different examples than my lecturer and I suggest it will be more useful since we are going to write some short essay, thank you man.” (First Time, First Year)
- “This serves to confirm with you that Podcasts are really useful as you may find that they explain everything quite well, and if there is something you need more clarification on you can simply replay it until you understand quite well... YOURS STUDENT” (First Time, First Year)
- “hi, i found them very helpful and useful. i used them close to the test as a general revision and it was helpful. hope to have them for part 2 also. Regards (name deleted). (First Time, First Year)
- I used your part 1 podcast and I must really compliment you on the effort you put into making sure that your explanations are as understandable as possible. You underestimate the quality of the podcasts though, I downloaded them and the media player software, and they are clear (graphs and everything) and the sound is of good quality in my computer. Going to

lectures and studying the book really help before listening to the podcasts. It's as if the podcast put colour to the black and white understanding of Econ 102. Thank you very much Big Up Mr. (name deleted). (Repeating Student)

- Please find my podcast diary attached. If I had known that they were going to help me this much, I would have gone through them on a regular basis right from the start, that's why I was so eager to start listening to Part 2. I hope that the experiment was a success and that you guys will be carrying on the podcasts in the future. Best regard (name deleted). (First Time, First Year)
- Dear (name deleted) unfortunately i don't know even to download that .would you please help me with more information in order to find that economics which is online. (First Time, First Year)
- Mr (name deleted) i have tried to access the podcast material but I was not able to because the computers at Govan Mbeki Lan do not have the sound cards and I even tried the other lans (the H1 Lan of Science Faculty and the sound would not come out) So I think the problem needs to be addressed. Thank you.
- The podcasts were very useful revision for part one thank you . (First Time, First Year)
- The podcasts enabled my studying to be more effective. It helped me to understand the concepts more. it gave me a better understanding of macroeconomics. Thanks (First Time, First Year)
- Please view the attachment below. And where I have typed in the word "yes" is when I listened to the podcast. I found it to be very helpful to me to use in the convenience of my phone. Thank You to The School of Economics and Finance. THANK YOU
- (name deleted) Thank you for the podcasts. I think they were very helpful. All the best with your project. (name deleted)
- "Good day sir: Just want to ask that, when will Part 2 of Economics (PPM) be available in the Podcast?" (First Time, First Year)
- "Hi! I used the podcasts, however I did not diarise my use of it. I used it the week before the test and I found it to be extremely useful. Thanks!" (First Time, First Year)
- "hello... is there any economics podcasts for part two??? the podcasts are very helpful to me and many of my friends... we writing next week please help. kindest regards" (Repeating Student)
- "When will the economics 102 part 2 podcasts be released? it is very useful. Thanks" (First Time, First Year)
- "Are there going to be any podcasts for part 2?" (Repeating Student)
- "To Mr (name deleted), I'm so sorry for the late reply. I used the podcasts for test 1. I think they are so good. I put them on my phone and found them extremely useful. I did not however keep track of the dates I downloaded them etc so I cannot submit the diary. Please can you post more podcasts as they are extremely helpful and I hope the other schools do the same soon. Regards, (name deleted) (First Time, First Year)

Based on these responses and the broadly positive results indicated by the sample group it was decided that the research was of a sufficiently important nature to justify extending the project.

As a result of the above and the availability of the newly installed Apple Podcast Producer™ server the second iteration of the research was designed in a somewhat different fashion focussed on a different group of students.

The 2009 sample was chosen based on the outcomes of the 2008 research. Due to the small respondent sample size in 2008 (37) combined with feedback received on a voluntary basis from all students who participated (including repeating students), a number of changes to the podcast research sample and production were introduced for this second iteration. The existence of the Apple server introduced a “true” video element into the production and the technology shortened production time significantly – allowing the researcher to be more creative in his approach. It became possible to include relevant video footage, and to use interactive websites as well as animated graphs to explain concepts, both in class with the help of a data projector and wireless connection to the Internet, and in the relevant podcasts. The 2008 feedback (or lack thereof) encouraged the researcher to utilise a more risky sample selection method. The risk involved using weaker students, the ECON1D0 group, who, based on their secondary schooling results (National Senior Certificate) had not been accepted into the B.Com. degree, unlike the 2008 sample. This selection was done on the basis that should the experiment succeed, it would make the results more compelling due to the fact that it can be assumed these students would face greater academic challenges than the ECON102 cohort. However, due to the smaller overall class size (110 with one lecturer as opposed to 1 800 with multiple lecturers on 2 campuses) the possibility existed for better control of the sample population in relation to tracking results. In addition the sample population was also more representative of the overall demographics of UKZN than the respondents to the first iteration, which had largely succumbed to self-selection bias due to the various issues listed above. The adjusted research model, both as a result of the availability of equipment and the sample was such that the researcher was certain he would achieve greater and hence more representative penetration, allowing for more statistically significant results. Based on these and other factors, it was furthermore determined that more of the course content would be made available via podcasts due to the ease of production as compared with the first iteration. In

addition, the students had the same lecturing staff involved with the tuition associated with the course. This limited the possibility of unaccounted-for external effects impacting on the performance of the students. In 2005, the course was delivered for the first time to the consolidated UKZN student body, providing a stable benchmark for comparison; in addition, the textbook was the same over the period under review.

Concurrent to this second round of research an independent study, proposed by the author's supervisor, was set in motion using the entire first year tranche of the School of Economics and Finance, including both the ECON102 and ECON1D0 groups. A survey tool was administered to gauge the attitude of students towards technological interventions in their modules. In addition, it served to ascertain student awareness of podcasting and their understanding and possible usage of the material available, both in UKZN and available on the broader web. This was brought about by the fact that both the author and his supervisor had encountered resistance to the use of the technology from other academics, mostly regarding the impact it would have on student lecture attendance and the development of the requisite skills to use the technology. This was not surprising as most of these staff had encountered video recording of conferences and seminars and knew that the pre-podcast technology required massive technical intervention. In some instances as many as 5 or 6 skilled staff were required to record a seminar or conference for video reproduction in addition to special lighting, sound engineers etc. The thought of taking over the functions of all these people single-handedly, while being the keynote speaker at the same time seems like a challenging, if not difficult task at first glance. These perceptions by staff had to be addressed, prior to the possibility of the implementation of podcasting on a large scale, across disciplines within the UKZN academic community.

Due to the high degree of synergy of the two studies, the results from a co-published paper (Maharaj & de Lange, 2010) based on this research will also be reported as part of this paper with the permission of the co-author. The responses to the survey were captured into SPSS 17 and subjected to statistical analysis. In addition to the basic data mining of the demographics and answers given to the questions using Likert scales and pre-selected answers, based on similar

research conducted into the use of technology in tertiary education in the developed world (Gajasinghe, 2007), a significant number of cross-tabulations were also analysed to give an indication of how specific segments of the data universe responded to selected questions. The results served to highlight the fact that there is very little difference between tertiary students in UKZN and in the first world.

The final round of research was a modified version of the first iteration (2008) of the research focused on the ECON1D0 group. This ensured better control of extraneous variables (the associated lecturing staff and text had remained the same for the period under review) and provided sufficient historical data for an accurate statistical analysis of the results. Informed by what had been learned in the previous iteration, the second iteration of the research was simplified. The availability of Podcast Producer® via the Apple Podcast Server meant that the podcasts themselves were easier and more time efficient to produce, while at the same time significantly more sophisticated. It was now possible to enter the realms of “edutainment” incorporating video downloaded from YouTube and the TED (Technology, Education and Design) website as well as utilizing animated graphics, both from the author’s own material as well as from Internet based resources such as Gapminder©. The production time was also equated to the length of the podcast, which was shortened. The podcasts were now designed around specific topics and economic issues rather than being a reflection of the standard 45-minute lecture. The extensive use of WiKi’s on the dedicated server provided the author the opportunity to publish metadata related to the specific podcast content. This in turn had the effect of simplifying the students’ search for relevant material amongst the podcasts.

Students were given access to the computer LANs that had the requisite software for viewing the material – this was important as the B. Admin. course did not have an IST module as a core module - hence students only had access to generic LANs that did not have the requisite software loaded. Students were also given a handout at the start of the semester with instructions on how to access the material in detail – working on the assumption that they had limited computer

exposure. In addition to the above, they had access to the tutors employed by the School of IS&T should they encounter difficulties.

Due to the nature of their degree, these students had a relatively low need for IT skills or knowledge of the use of IT infrastructure, as a result the author also utilised the data projector in the lecture venue combined with the newly installed wireless infrastructure to demonstrate, in stepwise fashion, how to access the server and view and download the podcasts. In addition, the students were shown how to use the WiKi and the opportunity was also used to explain to them how to identify the material that they were interested in if they were looking for something specific.

The sample was informed that there would be questions in the tests as well as in the exams drawn from the podcasts and it was emphasised that the answers were not available in the standard text. This was used as a means to motivate students to use the podcasts; in addition, it served to raise the conceptual difficulty level of the course. Regarding this issue, the introduction of podcasts introduced the possibility of making the course significantly more current as the instructor could rely on information published post the last edition of the textbook and set tests and exams on that material; prior to the introduction of podcasts there was a significant logistical overhead associated with this in the form of time and printing costs for handouts. This approach had been impossible with the first group due to its size, disparity of lecturing staff and the nature of the testing environment. The first two tests of the semester made good on the above content promise. After the first test the author started to receive feedback regarding the podcasts – emails would start to arrive when there was a server problem etc. This was taken to indicate interest; in addition, the fact that there was now a dedicated server, which allowed the use of RSS made it simpler for the students to access the information. The research paradigm was approaching the ubiquitous computing model that the students were comfortable with, and they embraced the technology.

To ensure even-handed access to all students in the group, the author also made the complete list of podcasts available, including the Apple Quicktime™ Media Player, two weeks prior to the final exam for students to download directly onto memory sticks from the author's computer. A

significant number, approximately 15, took advantage of this, predominantly White and Indian students, which would correspond to income and access to computers in the home. Assessment stayed unchanged, tests and exams were split 20/80 essay to Multiple Choice and the final mark was calculated on a 60/40 split: exam to test. These results were then compared to the results of previous years as discussed in the data analysis section below.

It bears repeating that the only difference between the 2009 cohort and the earlier cohorts was that podcasts were used in 2009. It may also be argued, that the introduction of podcasts allowed the lecturer to be more creative, leading to a more interesting learning experience, but also allowing the lecturer to be more adventurous in the questions posed in the examination, thereby increasing the level of conceptual difficulty of the course.

The basis of this research project is positivism, in the sense that the research analysed the results achieved and that these results, in the form of pass rates and marks achieved are subject to verification. This is in contrast to normative research, which would rely on open-ended questionnaires. In this instance, the answers generated by the research questions listed above would imply that the use of podcasts by first time, first year and repeating Economics students had a statistically significant impact on their results for the relevant course vs. the control groups of similar students without podcast support, for the same course. The null hypotheses generated by statistical analysis of the results of these individual groups implied that their results would fall within a normal distribution of the results for all students on the course, both current and past.

The ideal methodology for this type of research would involve using a dedicated streaming video server with individual secure log-ins, which would allow the researcher to track exact usage of all members of the experimental group, in terms of number of log-ins, duration and time of day. This would allow the researcher to allocate weightings to usage levels, permitting the construction of a model of usage frequency and intensity related to the demographics of the sample. The results of the experimental sample would then be statistically compared with that of the control group. However, bandwidth and software budget limitations in addition to a lack of funding required a more creative approach.

The procedure known as the Analysis of Variance (ANOVA) is used to test hypotheses concerning means, ANOVA can be used to examine the differences among the means of several different groups at once, unlike the t-test which would have to run multiple iterations of pairs and could as a result lead to a biased result. While the ANOVA may show a statistical difference in the averages, it does not identify which average is different. The pairwise Scheffé test was then used to identify which of the results differed from the norm that was derived from the analysis of previous non-podcast enhanced groups of ECON1D0 students.

5.1 Ethical Requirements

Ethical clearance for this research was a fairly simple matter as the study used public data hosted in the School of Economics and Finance. Data on first year student results formed the basis of the data sets. This information was extracted from the larger dataset of all students enrolled for the period under review. The author allocated unique identifiers to the student files that protected their identities and personal details of the participants (see Appendices). All original data was secured in the School of IS&T where it will be held secure for 5 years from the date of completion of the research. Permission to access the information was been obtained from the Head of School, Economics and Finance and furthermore all university conditions related to Ethical clearance have been met. A copy of the Ethical Clearance Certificate is attached at the end of this report.

5.2 Representative Sampling

Due to the nature of the first iteration of the study, the researcher had to rely on the voluntary participation of respondents. To assist with ensuring a high level of response, the School of Economics and Finance funded the purchase of 400 headsets that were distributed to the class in the following manner:

104 – to Economics 106 students (Augmented Economics)

296 – on first come, first served basis to Economics 102 students, handed out with their course materials.

Due to the large size of the data universe, statistical methods indicate that we would be able to gain insight on a sample of approximately 40 respondents – this represented 10% of the headsets distributed. Unfortunately, while the respondent base touched on the 40 number there were insufficient first time, first year students to ensure an entirely representative sample. This author, based on responses received (see above) theorises that this was in part due to the effect of the digital divide, and the effects of ubiquitous computing which led to some self-selection bias. There was also a flaw in the research design, in the sense that there was insufficient means for students who were not active participants in the project to communicate their difficulties. The means to address these problems were implied rather than stated. While impossible to quantify, several informal private discussions with participants the following year seemed to indicate that there were issues, which led to students becoming disheartened and losing interest in the process.

In addition to this, the sheer scale of the sample meant that there were several uncontrollable variables that could not be accounted for in the research design in the pilot study. Among others, this included the fact that there were several staff involved in lecturing the course content that the podcasts covered, each using their own original material and examples to demonstrate concepts. In the light of these issues and in addition to the fact that the Apple Podcast server was brought online, it was decided to revisit the research, somewhat modified, which was the reason behind the selection of the action research model (see above).

Based on the lessons learned from the first iteration, the sample for the second iteration was much more controlled in its selection. The group was smaller, the external influences were controlled, the course content covered more extensive, allowing greater ease in identifying the effects of the podcasts. By including material from outside of the textbook in the syllabus and exams, students were also obliged to use the podcast material, which was user-friendlier to access. The sample, by virtue of size and demographics was representative of the first year class for Economics, both first time and repeating students. In a final attempt at inclusivity, the material was

made available to students 2 weeks prior to the final exam directly from the researcher's laptop, saving students the need to download them from the server. Less than 20% of the class took up the offer, which the researcher took to be an indication that the podcast server had a positive impact on ease of access.

Data was subjected to an ANOVA (Analysis of Variance) test which as a group of statistical methods have in common 2 assumptions:

1. The standard deviations (SD) of the populations for all groups are equal - this is sometimes referred to as an assumption of the *homogeneity of variance*. It is possible to represent this assumption for groups 1 through n as

$$SD_1^2 = SD_2^2 = \dots = SD_n^2$$

2. The second requirement; that samples are randomly selected, does not apply in this case, as the sample set is the population.

In addition any research of this nature will encounter some self-selection bias, hence the effect is going to be roughly equal for any research based on members of a specific education course. Certainly, there is some bias as they represent the weaker students within the sample, based on National Senior Certificate (NSC) results. However, from the perspective of this research that is actually a positive bias as it would reinforce the effectiveness of the solution under investigation, in the sense that as it was effective for this group it should be possible to generalise the results to the larger sample. Had these students been an academically strong group based on the National Senior Certificate results (for instance Bachelor of Business Science students) it would have been more difficult to make this generalisation. As it is they are demographically representative of the faculty intake of first year Economics students and as such provide the author with a sample and hence results that he considers sufficiently representative to generalise to the first year tranche of Economics students.

The stand-alone questionnaire based research, run concurrently with the second iteration, was representative of those students that attend lectures regularly, which was the focus of the research, and as such the respondents met all requirements for representative sampling.

5.3 Limitations of the Study

In the first iteration of the research, the major limitations fell into broadly two categories. The first was related to self-sampling bias due to the effects of the digital divide. Post hoc it became clear that the effects of ubiquitous computing combined with the uneven exposure students had had to IT at the secondary education level created barriers to entry that the research design had not compensated for. The intention had been to separate out the ECON106 group for separate analysis to ascertain the impact of this effect, however they were not represented in the sample - headsets not withstanding - therefore this became impossible.

Another issue was the effect of uncontrolled variables due to the size of the group and the fact that there were several staff members involved in the actual presentation of the course, introducing immeasurable variables relating to materials and examples used. It was very difficult to ascertain whether all staff actively encouraged students to use the podcasts. Within the context of uncontrollable variables fall the standards related to the National Senior Certificate Exams. These are the exams that permit university entrance; UKZN and the majority of the other tertiary institutions in South Africa use the weighted results in these exams to assess student potential and determine access to different degree programs. Within the Faculty of Management Studies at UKZN, the Bachelor of Administration Degree has the lowest entry requirements. In the course of this research the Department of Education made some adjustments to the nominal scoring systems, however, this had no impact on the real content of the syllabus. UKZN in response to these changes merely adjusted its requirements accordingly and maintained the same entry requirement standard, irrespective of the associated nominal numeric value.

The lack of log-in tracking due to wanting to make access as simple as possible at the time of the first iteration of the core study meant that the researcher only had the self-sent emails to make up a sample and this served to limit the quality of the sample in terms of its size and match to the overall population. In addition, without this data, it was impossible to build a mathematical model relating usage frequency and activity to results achieved.

The questionnaire-based research, which was done concurrently to the second iteration of the study, turned out to be much more representative with a sample size of 313 respondents. The author maintains that the responses are a valid reflection of the attitudes of those students that regularly attend lectures and that the information gleaned from this research can be safely generalised to the first year UKZN student population, studying Economics. The questionnaire is adapted from Gajasinghe and has been subjected to reliability testing using the Chi-square test, which found that the data had a significant relationship between the variables (Gajasinghe, 2007).

The second iteration of the core research was designed based on what was learned in the pilot study. By using a smaller group of students, it was possible to minimise external effects based on the possible impact of multiple presenters on sample behaviour. The upgrade of the server side equipment had an impact on the ease of use, which allowed easier access to students who were stifled by the digital divide in the first iteration. The researcher also believes that the nature of the podcasts themselves e.g. full motion movie files with embedded animated graphics to demonstrate concepts, in addition to the shortening of the files so that they focus on a topic rather than being a reflection of what was covered in a lecture made the files more user-friendly; embedding the files in a Wiki that supported Meta Data certainly assisted in that regard. In addition to this, the ability of the hosting server to support RSS technology meant that there was minimal intervention required by the students as the files were automatically downloaded to those students with access to the UKZN network and a PC or compatible personal wireless device with aggregator software installed such as an iPhone or Blackberry device. The final step in attempting to minimise the effects of the digital divide was making the complete podcasts and an associated media player directly available from the lecturer's computer for download to memory sticks.

There was no feedback received that indicated difficulties associated with access to the material, aside from very infrequent server side or network issues. The sample was sufficiently representative of the UKZN first year economics student population (at the academically weaker end of the scale) to provide representative results. No doubt being able to track individual users via a secure log-in tracking system would have made the analysis of the results more accurate from the

perspective that a usage model could have been built relating frequency of use to the actual impact it had on results. However, even that would have had sampling issues due to students downloading the podcasts and viewing them off campus, rather than relying on streaming the videos live off the server. In the final analysis, the research is focussing on whether the availability of podcasts has a significant effect on a representative sample of students' results overall and the researcher believes that the results recorded in the second iteration of the research allowed the question to be answered with a statistically significant degree of certainty, both for first time, first year students and the overall first year tranche of UKZN Economics students (repeating students included).

6. Data Analysis

Assessing the statement: 'Podcasts have a statistically significant positive impact on the results of first time, first year students in Economics' required that the core research in this study was done utilising quantitative data (test and exam results) generated over a period of time within the school of Economics and Finance in UKZN. The research question generated a number of sub problems (see above pp. 39-40). For the research to answer all the related questions there are a number of pre-requisites; firstly the research required a sufficiently large and representative sample to provide statistically significant and verifiable results. In addition to this, the data sets needed to be accurate, comparable and 'clean'. For the research to generate scientifically acceptable results there needed to be identifiable and strong causal relationships, between the independent and dependent variables. To ensure the accuracy of the relationships the research design had to incorporate the ability to compensate for self-selection bias. Data collection was achieved by mining the databases of past and current (at the time of the research) first year students in the School of Economics and Finance UKZN, Westville campus.

Due to the lack of a suitably large and representative sample, the results from the first iteration of the research were used as a pilot study. The overall sample broke down as follows: African 44%, Indian 31%, White/Coloured 25%. In addition, 78% or only 28 of the respondents were first year, first time students. While the respondents were broadly representative of the

student body overall, the first year, first time sample was deemed too small to use with a high level of confidence. However the sample did produce some results that are worthy of discussion.

Below is a graph representing the sample results related to the three tests written during 2008 by the test sample. Note that the podcasts that were produced, due to the time-consuming nature of the methodology used at the time, only covered the syllabus up to the end of part 1, which coincided with test 1. It is immediately apparent that the results achieved for that section are superior to what was achieved for the other two tests. At this point it is also worth noting that the calculation of the year mark for ECON102 follows the norm for the School of Economics and Finance. All students are required to write three tests during the course of the semester, roughly equally spaced out in terms of time and the quantity of the syllabus that they cover. The Duly Performed (DP) mark is calculated based on the average of the two highest marks attained.

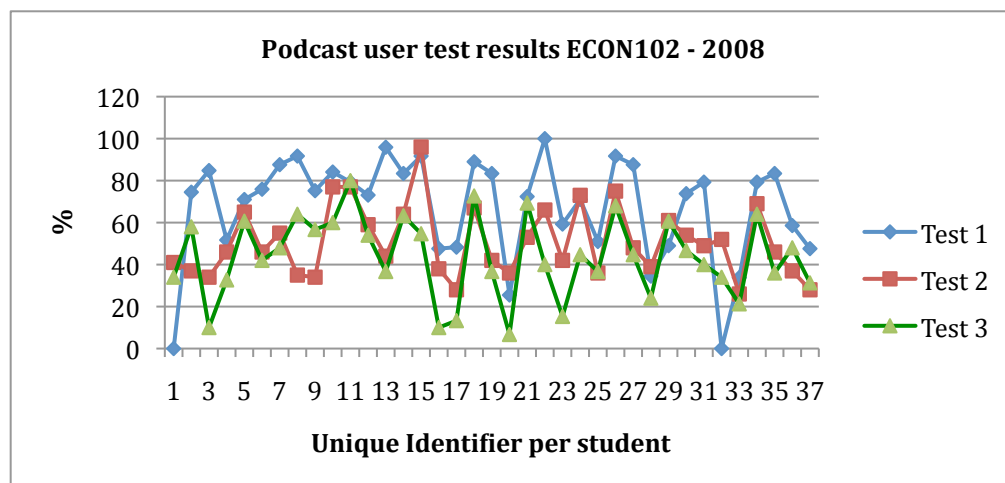


Figure 4 - 2008 - Podcast User Test Results

Source: UKZN School of Economics and Finance – 2009

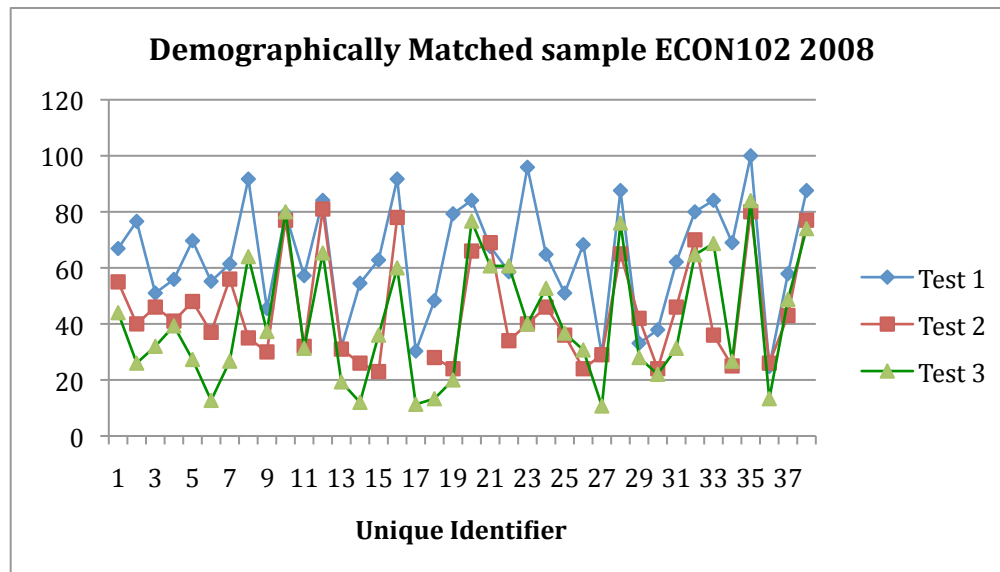


Figure 5 - Demographically Matched Sample Test Results – 2008

Source: UKZN School of Economics and Finance - 2009

As can be seen from the above graphs there is a noticeable improvement in overall performance when comparing test one with the other two tests, when observing the test sample results of the podcast participants. The demographically matched sample shows the same trend, albeit to a lesser degree. (Sample matched on academic year of enrolment, race and sex)

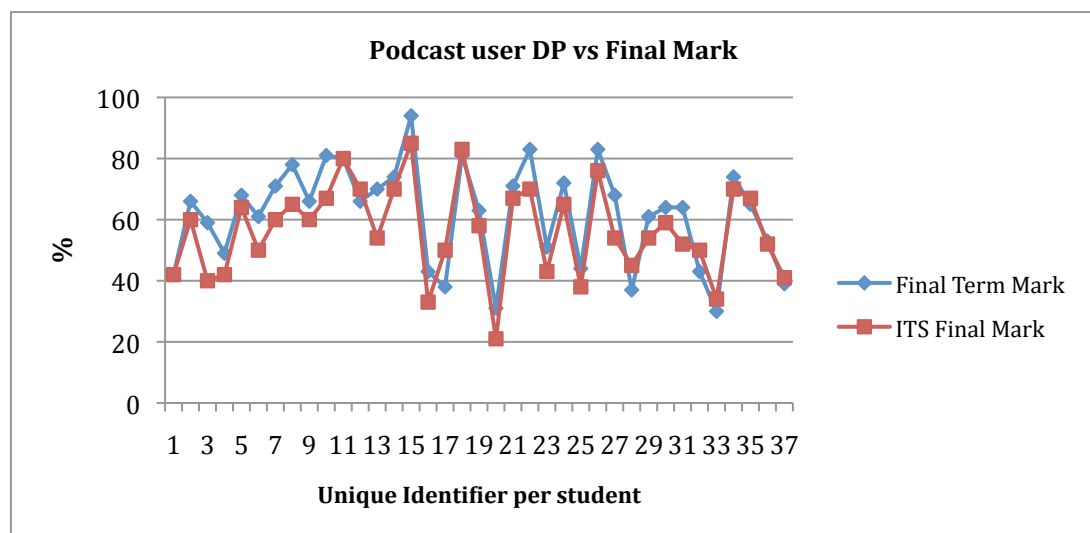


Figure 6 - Podcast User DP vs. Final Mark – 2008

Source: UKZN School of Economics and Finance – 2009

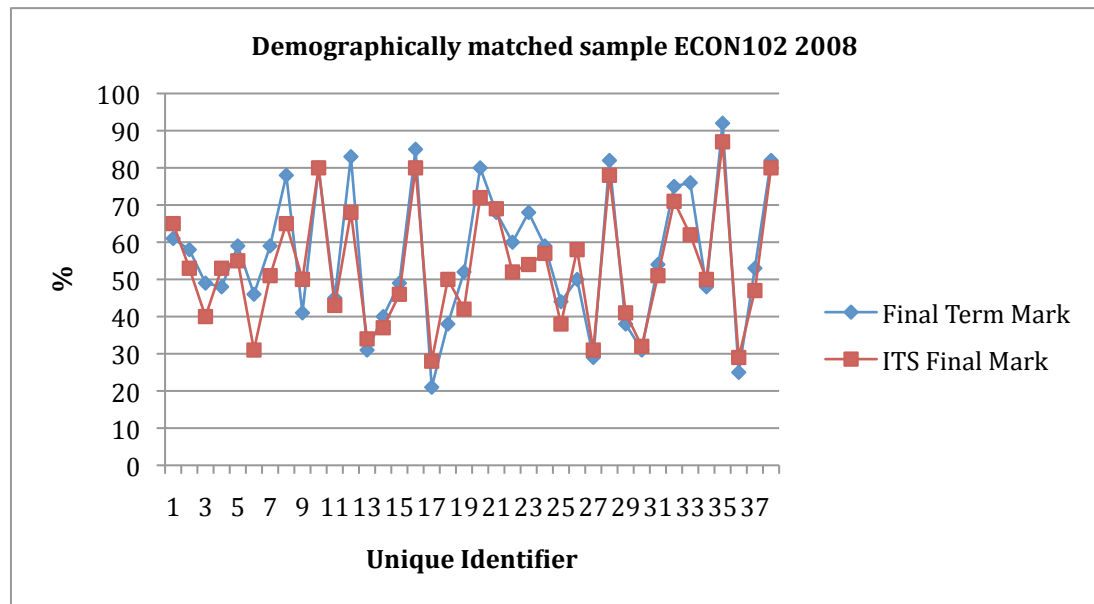


Figure 7 - Demographically Matched Sample DP vs. Final Mark ECON102 – 2008

Source: UKZN School of Economics and Finance - 2009

Once combined into the final DP and compared with the final mark, the effect is somewhat diluted and is not substantially better, than that achieved for the overall sample (see Figure 6 above). When compared with the demographically matched sample based on an eyeball test alone, it is not possible to make claims regarding the efficacy of the technology that can be generalised to the entire population with statistical certainty due to sample size issues. In addition limiting the research to test 1 alone may have been affected by test difficulty levels as the researcher had no input into setting the test.

The responses received in the form of the unsolicited comments listed above (pp 51 – 52), combined with informal discussions with students served as the basis for the decision to revisit the research with a second, more manageable sample.

Between iterations, a survey was submitted to students designed to assess their attitude to the use of electronic material as part of their course work, and their knowledge of, and attitude toward podcasts and their use. In addition, the survey assessed student responses to how these technologies would impact on their lecture attendance. Selected results are recorded below.

A total of 313 students responded to the survey. Of these 142 (45%) were male and 171 (55%) were female students. The racial breakdown was as follows: 144 (46%) were African, 1 (0.3%) was Coloured, 154 (49.2%) were Indian, 12 (3.8%) were White while 1 (0.3%) defined themselves as 'other'.

Figure 8 below presents a description of the sample universe's response to a question regarding existing ownership of, or intention to own, an MP3 player. This question was taken to be an indication of awareness of the audio compression technology, as it existed at the time, although not an indicator of its use for pedagogic purposes.

A surprising 10% of the sample indicated that they had no interest in owning an MP3 player while a further 33% did not have one at the time of the survey, but indicated that they would like to have one. This implies that 57% of the sample had access to an MP3 player in some form or the other. By far the majority of the students in the sample were aware of what an MP3 player is and were in possession of, or intended to own one (89.7%). Additionally more than 60% of the sample had a good idea of what podcasting entailed; given a choice of three definitions the majority chose the 'most correct one'. When compared with the total population - "12% of South African adults under the age of 25 have an iPod, MP3 player or walkman. For those older than 25, the proportion is 6%," (South African Advertising Research Foundation, 2009) - it becomes obvious that University students are early adopters in the ownership of these devices and as such are therefore a logical target audience for communication that relies on the ownership of these devices.

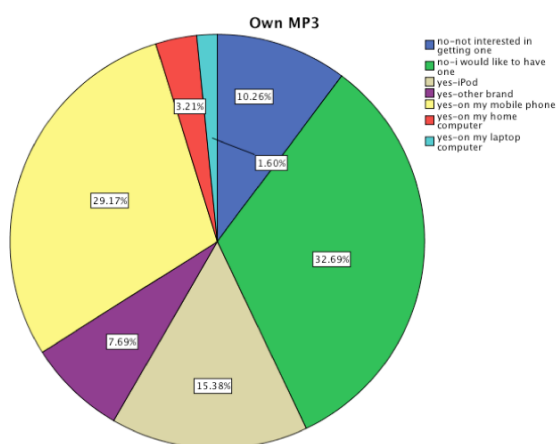


Figure 8 – Ownership of MP3 Player

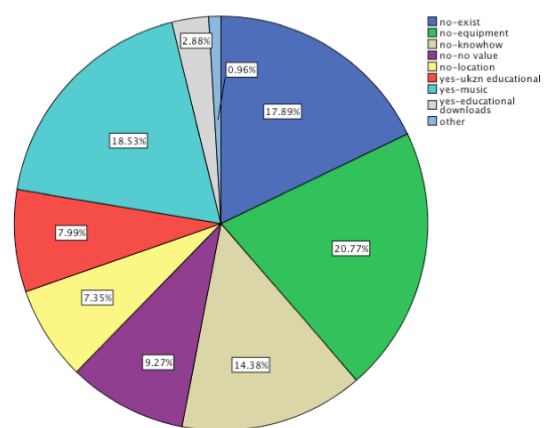


Figure 9 – Use of Podcasts

When questioned specifically on the use of Podcasts by the respondents for both entertainment and educational purposes, approximately 70% of the sample universe indicated that they did not make use of podcasts at all. The reasons for this are contained in the different categories of figure 9. The categories break down as follows: 'No I did not know that podcasts exist' (17.89%), 'No, I do not have the equipment to listen to podcasts' (20.77%), 'No I do not have the knowledge to access podcasts' (14.38%). Importantly however, of these students only 9.3% saw no value in using podcasts. Eight percent of the sample uses course-related podcasts at the university. This is consistent with the relatively limited use of the technology on the UKZN campus at the time of the research. A very small minority (2.9% of the total) indicated that they accessed educational podcasts that they downloaded from non-UKZN sources. A significant proportion of the students did use podcasts to source music (18.53%). This analysis suggests that since only 9% of students saw no value in the use of podcasts, that this technology has promise as a tool for teaching and learning at UKZN, from a student or demand - driven perspective.

The 82.5% of respondents who responded positively to the question which enquired, whether students received lecture material electronically highlights the fact that the respondents are accustomed to the idea of receiving material electronically. The response to the question: "Do you think that it is a good idea to have lecture material available online?" was the single largest positive result achieved in the survey with a result of 95.2% in favour of this application.

It is clear that the respondents are comfortable with the use of online resources for learning purposes. The lack of uptake of podcasting may be ascribed to a lack of knowledge and limited availability at the time of the research more than any aversion on the part of the respondents to using the technology for study purposes. The fact that the uptake of MP3 players is significantly greater than the norm for the population (57% vs. 12% in the same age group) is indicative of a willingness to experiment with technology and become an early adopter. Certainly it must be acknowledged that within the South African context the cost of downloading information is very high by world standards and while this is bound to have an impact on off-campus usage, the availability of broadband on campus effectively removes these cost considerations.

Informal interactions between the author and colleagues suggest that one of the primary objections to the implementation of podcasting as a teaching and learning tool at the University is the perception by lecturers that students will not attend lectures once recordings of the lectures are available. This perception is very strong and even referring these staff members to studies done in foreign universities that maintain that this is not the case does very little to allay their fears or change their perceptions. The fears are deep-seated as they relate to among other things job security, and possibly fear of change. Due to the significance of the strength of this perception and its potential impact on the adoption of the technology the author investigated the attitude of the sample to this issue. Interestingly, the results show with a very high degree of confidence that students who currently attend lectures will not stop attending lectures once podcasts become available, this is in line with the experience recorded in the developed world.

Figure 10 below represents a frequency histogram of Q14 'If you attend significantly fewer lectures than you should, the reason is:' with all options considered. The results indicate that the majority of respondents regularly attend lectures; this is indicative of the target group of students that podcasting is designed to assist as the podcasts as such are intended to be an addendum to lectures and not a replacement of lectures.

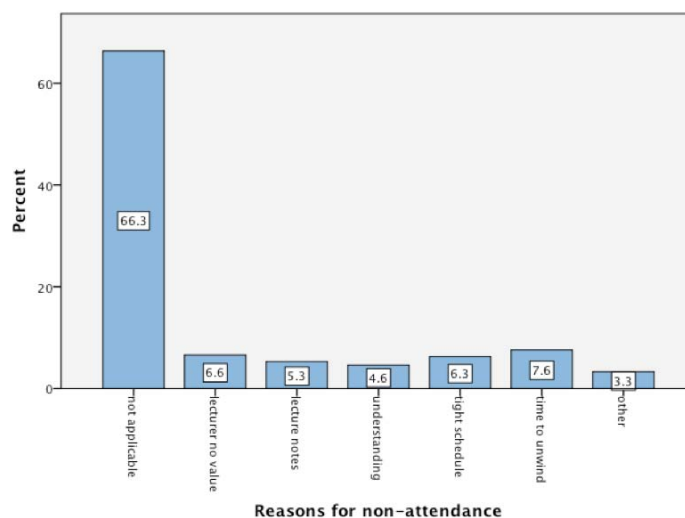


Figure 10 - Lecture Non-Attendance

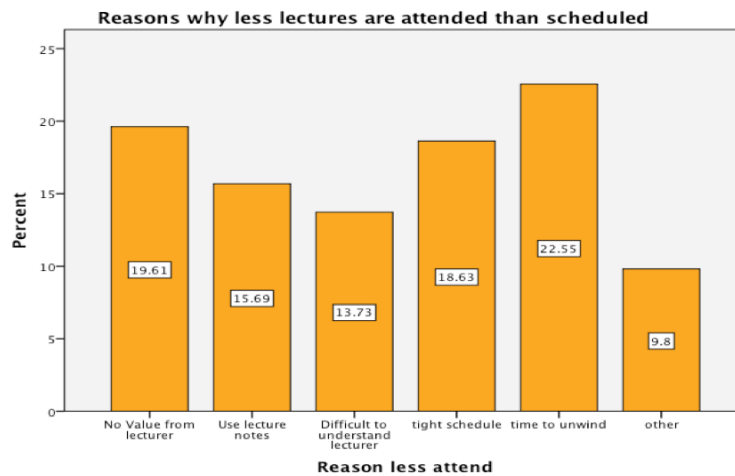


Figure 11 - Reasons for Non-Attendance

Figure 11 above represents the responses to the same question but with the “not applicable” option discounted, i.e. the responses represent approximately 34% of the respondent sample. Of these 49% (16.6% of the total sample) give reasons directly related to the lecture, content or other variables, to wit: ‘I get no value from the lecturer’ (19.61%), ‘I use lecture notes’ (15.69%), ‘it is difficult to understand the lecturer’ (13.73%); while the remaining students give reasons related to scheduling (6.3%) and stress relief (22.55%) etc. This indicates that low attendance rates are not solely based on reasons internal to the course/s and/or student motivation. This in turn implies that a significant proportion of non-attendance is due to circumstances beyond the student’s direct control. For example, due to the high incidence of course repetition (19.6% of the sample are beyond their first year of study) within the School of Economics and Finance, a substantial number of students find that they have schedule clashes that cannot be avoided. Here the “time shifting” (Evuleocha & Ugbah, 2007) nature of podcasts can be of real benefit to those students affected by such circumstances.

Of the students who would continue attending lectures even when recordings were available, 62% would use the recordings as added resources and 30% feel that the recordings will free them from taking notes to concentrate on what the lecturer was saying. These results are in line with

results reported in a number of studies from other tertiary institutions. To wit: “Students reported that podcasts helped their learning by providing a good introduction to the online material; helping to organise weekly learning activities; helping to stay focused on the course; developing positive attitudes towards the lecturer, making formal learning more fun and informal; supporting independent learning; enabling deep engagement with learning material; enabling access while being mobile. The study also emphasised that listening to educational material was different from listening for entertainment; therefore, podcasts must be integrated with other learning activities” (Edirisingha & Salmon, 2007).

Figure 12 below represents the frequency distribution of Q15, (If recordings of lectures were made available online, would you still attend lectures?) for all students who attend all their lectures. The results indicate that more than 90% of the respondents would still attend lectures if recordings were made available. A nonetheless disturbing result embedded in this very favourable result is the fact that only 2.5% of the sample indicated that their motivation for attending lectures was that they enjoyed the activity. This may be indicative of a fundamental problem; Generation Y seems to find the present mode of delivery to be less than engaging. Research into their lifestyle has indicated that they are fundamentally multi-taskers and that the availability of podcasts suits the habits that they have developed as a result (Evuleocha & Ugbah, 2007). This might also be at the heart of the high level of non-attendance reported informally by staff that becomes progressively worse as the semester runs to its conclusion.

However, the majority of the respondents attend due to seeing value in the lectures. These results, combined with the question related to availability suggests that podcasts will not empty lecture venues. The lack of data from students that are non-attendees is not relevant to this issue as the availability of the podcasts is unlikely to affect their present behaviour in a negative fashion as far as lecture attendance is concerned. In fact, it is conceivable to develop a system of podcasts that are related to the content of the lectures in such a way that they become totally interdependent, thereby encouraging students to use both methods to achieve a holistic picture of the course material. The researcher did that in the second iteration of the project through the simple means of

including live demonstrations based on Internet resources done in lectures into the podcasts and then setting test and exam questions based on that. Students were made aware of this prior to the tests and exams.

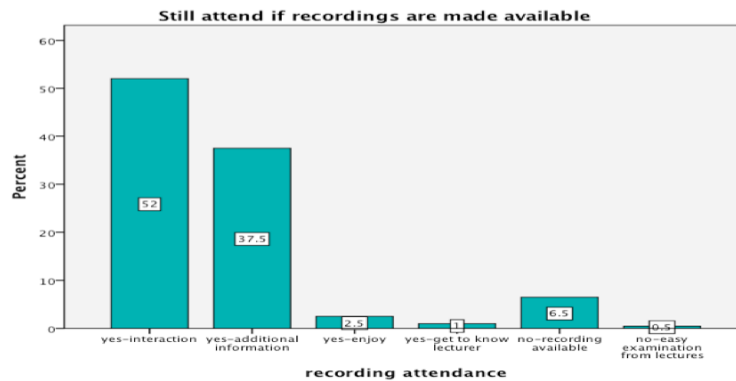


Figure 12 - Lecture Attendance when Recordings are Available

A similar analysis as that above for the question “What do you believe will be the things you would miss most should podcasts replace lectures?” shows that 78% of the respondents indicated they would miss the lectures for academic or syllabus related reasons while the remaining 22% focused on the social element of attending classes. This result indicates that the existence of the technology per se will not have a measurable effect on classroom attendance, as the content of the podcasts will not provide for the same needs as a live lecture, again similar to findings in developed nations.

However, the availability of lecture podcasts will allow students to catch up with missed lectures in their own time. This resource has the added benefit of adapting to the learning pace of individuals. Within the South African tertiary education milieu this is arguably the greatest boon associated with the technology; it holds within it the potential to level the very uneven secondary schooling playing field that tertiary institutions draw from. Research released in August of 2009 (Smetherham, 2009) indicates that less than 7% of first year University entrant students had the required level of Mathematics skills, and that in excess of 70% would require assistance to pass. The figures for English were in the 50-percentile range. For many students at the University of Kwa-Zulu Natal, this represents a very real difficulty, one that access to podcasts can help

overcome.

It is clear from the foregoing that the availability of podcasts will have a negligible impact on lecture attendance in the Economics 1 class. While these results apply to specifically Economics students it is entirely possible that they could be applicable to the general student body. This research indicates that the Economics 1 respondents see value in actually attending lectures. However, there is also a clear message that as educators we need to assess the mode and methods of delivery as students are attending lectures because they feel they have to, not because they enjoy the experience – and this will obviously impact on motivation, if nothing else. This also relates to the limitations of ‘craft knowledge’ in a changing environment as a basis for teaching methodologies as highlighted above in the literature survey (pp 24 - 25).

The history of the B.Admin. degree at UKZN is relevant to the discussion at hand. In 2005, a Faculty decision was taken to disband the undergraduate element of the degree – as this is part of the sample and impacts on the results, it is necessary to discuss this at this point. In 2006 and 2007, the entire sample was made up of repeating students – both from the B.Admin. course and students that had downgraded their degrees from a B.Com. This had an impact on the performance of the sample due to learning effects. This decision was reversed in 2007 leading to a renewed intake of first year students in 2008 – returning the sample to a mix of old and new students and returning the results curve to the norm. This trend is clearly evident in the results obtained and presented below.

6.1 Primary research findings

Five years of results for the ECON 1D0 course are presented in summary form below.

Year	2005	2006	2007	2008	2009
Median	53	56	74	58	63
Average	52.3	55.4	72.7	58.0	62.7
Variance	153.6	89.6	66.16	112.66	84.3
Std Dev	12.4	9.5	8.1	10.6	9.2
N	55	45	64	83	108

Table 2 - ECON1D0 - 5 Year Data

All figures are reported here to just one significant digit but calculations were carried out to

a higher significance level. The class average mark was used as a measure of how well the class was performing. To test whether the averages obtained over the five years are statistically different, an ANOVA was performed followed by a pair wise Scheffé test. The procedure known as the Analysis of Variance or ANOVA is used to test hypotheses concerning means; it can be used to examine the differences among the means of several different groups at once unlike the t-test which would have to run multiple iterations of pairs and could as a result lead to a biased result, depending on how pairs are combined. While the ANOVA may show a statistical difference in the averages, it does not identify which average is different. The Scheffé test was used to identify which of the readings differed from the others.

The ANOVA, with $\alpha = 0.05$ (significance) and $v_1 = 4$ and $v_2 = 350$ yields a calculated Fisher value of

$$F = 39.07$$

The critical value, F_c , for these parameters is (obtained from standard tables or from websites such as <http://www.danielsoper.com/statcalc/calc04.aspx>)

$$F(\alpha, v_1, v_2) = F_{0.05, 4, 350} = 2.40$$

Clearly $F > F_c$, which means that the set of average scores are not all the same. That is, there is at least one average score in the list that is statistically different from the others. To determine which of the averages are different, a Scheffé test was performed.

The results of this test are summarized in the table below:

$F_s(1,2)$	$F_s(1,3)$	$F_s(1,4)$	$F_s(1,5)$
2.35	124.64	10.75	40.11
	$F_s(2,3)$	$F_s(2,4)$	$F_s(2,5)$
	80.44	2.27	17.45
		$F_s(3,4)$	$F_s(3,5)$
		79.44	40.48
			$F_s(4,5)$
			10.77

Table 3 - Scheffé Test Results for ECOD1D0

Here $F_s(i,j)$ indicates that the averages for datasets i and j are being compared.

The critical value of the F-statistic for the Scheffé test with the parameters, $\alpha = 0.05$ and $v_1 = 4$ and $v_2 = 350$, is

$$F_{sc} = 9.59$$

The bold entries show values of F_s (calculated F value for the Scheffé test) that are greater than F_{sc} . Interestingly, all pairs containing datasets 3 and 5 (years 2007 and 2009) show a statistical difference. In analyzing these results, it was not initially clear why the 2007 class showed a statistically better average than the other years. Upon further consideration it became clear that the Faculty decision to “close” the module (not register new students) led to the course being taken by repeat students only. In addition, 2007 was the last year that the so-called pipeline students from the previous University of Durban-Westville could take the ECON1D0 course and, if they performed better than at the 65% level, be given a credit for ECON102 which is a compulsory module for the B.Com. degree. This in all likelihood explains the better results of this cohort of students. It must be emphasized that the course lecturer was the same and the course content remained unchanged from the previous years.

The year five cohort (class of 2009), also shows a statistically different class average from the other years in this study. As indicated earlier, the lecturer remained the same. It was also ascertained that the course was probably made more challenging by the introduction of new concepts. The only pedagogical difference between year five (2009) and the other years was the introduction of podcasting. After a careful and thorough analysis it is difficult for the author to identify any other factor that may contribute to this result. As a justification for this assertion a similar analysis is presented for the ECON1C0 class over the same period of time. This class had a high level of student duplication with ECON1D0. The lecturer for the ECON1D0 module was also the module coordinator for ECON1C0 and shared the course with one other lecturer on a 2/3:1/3 basis. This makes this module a control group as these are the same cohort of students under the same conditions – all that is missing is the podcasts. ECON1C0 is the Micro Economics module while ECON1D0 is the Macro Economics module for the same group of B.Admin. students.

The results for this group are presented below.

Year	2005	2006	2007	2008	2009
Median	55	56	62	58	53
Average	55,3	56,8	59,6	57,1	53,2
Variance	166,5	129,3	120,4	214,5	139,7
Std Dev	12,9	11,4	11,0	14,6	11,8
N	69	56	83	90	111

Table 4 - ECON1C0 - Five Year Data

Here again results are only reported to one significant digit.

The ANOVA, with $\alpha = 0.05$ and $v_1 = 4$ and $v_2 = 404$ yields a calculated F value of

$$F = 3.40$$

The critical value, F_c , for these parameters is

$$F(\alpha, v_1, v_2) = F_{0.05, 4, 404} = 2.40$$

These results suggest that there may be a statistical difference between the average

scores for the different years. Again, the Scheffé test yields:

$F_s(1,2)$	$F_s(1,3)$	$F_s(1,4)$	$F_s(1,5)$
0.40	4.42	0.76	1.28
	$F_s(2,3)$	$F_s(2,4)$	$F_s(2,5)$
	1.75	0.03	3.07
		$F_s(3,4)$	$F_s(3,5)$
		1.79	12.64
			$F_s(4,5)$
			4.85

Table 5 - Scheffé Test Results for ECON1C0

In this case

$$F_{sc} = 9.58$$

A comparison of F_{sc} for this case with the values in the table show that the only statistical difference in the class averages is evident when the class of 2007 is compared with the class of 2009, $F_s(3,5)$, where it may be concluded that the 2009 cohort on average scored less than the 2007 cohort. There is clearly no systematic effect evident, unlike the analysis provided above for the ECON1D0 class.

The first time, first year sample is not as complete - there are no results for 2006 and 2007 - as the overall sample of all students including repeat students. Since the distribution of the marks

is not normal and since the variances are different between the groups, non-parametric tests are indicated. Note that ANOVA is less robust in this case and post hoc tests need to be done to verify / confirm the conclusion. In this case the test confirms that the average marks are the same. This test is not that important here and is difficult to fully interpret.

Below find a smoothed graphic representation of the results achieved for 2008 and 2009 compared to the norm. This highlights that the 2009 tranche out-performed their 2008 equivalents. Kernel density estimates run on the 2008 and 2009 samples provides the data for the smoothed graph below.

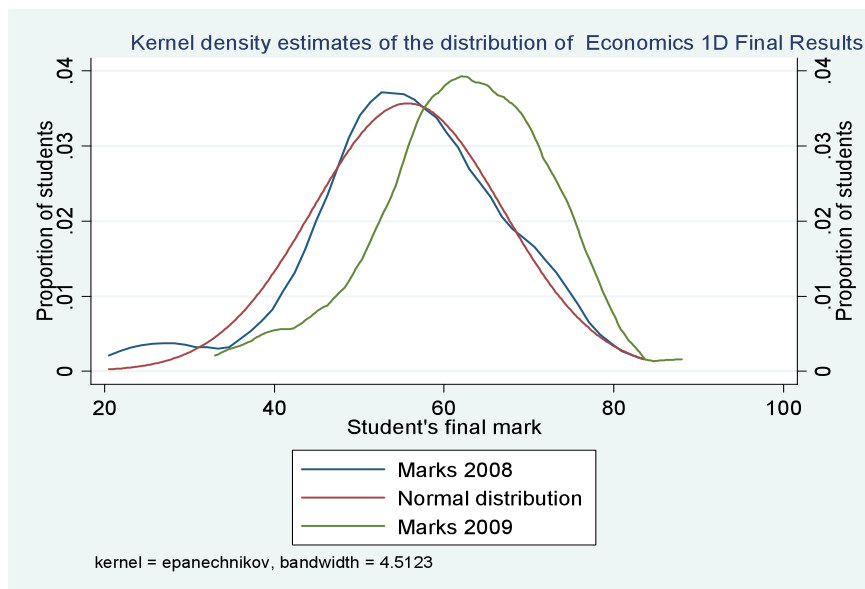


Figure 13 - Kernel Density Estimates ECON1D0

This result is in line with the result for the whole class including repeat students reported above.

7. Conclusion

The purpose of this project was to assess the potential of multi-media applications, specifically in the form of podcasts, as a solution to a number of issues relevant to the teaching of Economics to first year students in a South African context. The podcasts provide a means to distribute information to students in a flexible way that allows them to do revision and to progress

at their own pace, something that has been found to be of benefit in the developed world. This solution is extremely important in the UKZN context, as due to the growth in student numbers it has of late become impossible for the School of Economics and Finance to provide adequate tutorial support to first year students.

The selection of first year students as the focus of the study was driven by past research and discussions on eLearning, multi-media and pedagogic theory. While there are issues around the applicability of much of the pure theory, previous research does indicate that the method of delivery should be determined by the nature of the learning objectives of the course. In the light of this the content of the podcasts focused on so-called “Initial Knowledge” materials. These include; facts, definitions, rules of discourse and the inter-connectedness of issues within the discipline of Macro Economics. It was theorised that this would assist the students in the development of the basic skills and vocabulary that they required in performing the analytical tasks required of them at this level of study.

The first iteration of the core research, a pilot study, was intended to identify difficulties with implementation; the author identified amongst others, the impact of ubiquitous computing on access and to a certain degree the impact of the digital divide. Unfortunately from a scientific position, the pilot study encountered a number of uncontrollable variables. Nonetheless, the results achieved by the sample indicated that there was a positive correlation between the availability of podcasts and test results. When compared with random samples taken from previous years, the results achieved for DP in relation to final mark was approximately equivalent based on an ‘eyeball’ test. Due to the size of the first time, first year sample, it was difficult to draw statistically significant results from the pilot study. Unsolicited feedback on the content and the concept was universally enthusiastic on the part of the participant user sample that provided the author with feedback via email (samples above, pp 51 - 52). In the light of what was learned the study was redesigned and a second iteration, using different software and a more rigorous sampling base was planned for the following year.

While doing presentations to academic staff on the concept and the modalities of podcasting,

it became clear to the author and his supervisor that there was a significant degree of resistance to the concept. Most of the informal discussions revolved around concern about the impact that the technology would have on lecture attendance. The perception held was very strong. In the light of this, a separate questionnaire-based research study was undertaken amongst first year Economics students to assess their knowledge of podcasting and the impact, if any, that it would have on their lecture attendance behaviour. The results indicated that South African students have more in common with their first world brethren than what the academic staff give them credit for. The second iteration of the core research study was designed to overcome difficulties related to access encountered in the pilot study. Should the second round of results have indicated the continued existence of a digital divide based on cultural and language differences, it would have held important implications for the use of digital multi-media within a South African tertiary milieu. In effect this would become a barrier to entry for those students affected, arguably the very people who needed the additional support the most. While by no means implying that this medium of instruction becomes impossible, it certainly would have indicated the need for some sort of equivalency intervention to ensure that the use of digital media did not entrench the existing digital divide. That would have involved additional expense and resources that would have been difficult to access.

However, the results of the research indicated that once the podcasts were available in a form that matched the ubiquitous computing model that the mass of students are used to, no such differential existed and it became possible for the technology to bridge the digital divide. In addition to this, the trend of globalisation of English via its use in the Internet and as the lingua franca of global trade and academic research has made fluency both in speech and comprehension essential to the tertiary student who wishes to find employment in the globalized economy. While this has been subject to a large number of criticisms, both from politicians and academics, it does however remain a fact (Warschauer, 2002). The results indicate that if language proficiency had been one of the core issues with previous performance, the podcasts certainly made a difference to student performance. This is also in line with research done by Warschauer in a number of

locations around the world.

7.1 Conclusions: Podcast impact on lecture attendance

The high level of acceptance and exposure to the delivery of course content electronically within the respondent base, in addition to the almost unanimous demand for the delivery of course content via podcasting is indicative of a demand-pull scenario for the delivery of podcasting content. From a student perspective, this indicates that, as in the more developed countries where the technology has been implemented in a pedagogic environment, there should be no barriers to entry within South African universities – at least from the students' perspective.

The results of the research indicate that issues around lecture attendance dropping due to the availability of podcasts, as mentioned in informal discussions with academics as well as at workshops on the technology, are a matter of perception. Responses to questions regarding lecture attendance indicate that the vast majority of the respondents will not use the podcasts as a vehicle for deliberate non-attendance in lectures. The research furthermore highlights that amongst the participating students who miss lectures, significant proportions do so due to timetable clashes related to straddling academic years. A significant proportion of this problem would be addressed by improving pass rates within the subject of Economics. Podcasts represent one means of addressing that issue. What the research highlights is a need for further research to determine the cause of these perceptions as well as the dissemination of research results that highlight the positive results achieved to date using the technology as a means to address these perceptions. The current pedagogic model has been around for centuries and resistance to change of a paradigm shifting nature is natural; however, as academics we need to embrace change that will be beneficial to students in the sense of improving the transfer of knowledge. This is especially relevant in the South African context where our unique tertiary challenges are a matter of critical strategic importance, not only to universities but the developmental state as a whole.

That said there is a very strong indication that the University has to investigate finding ways to create greater enthusiasm for lecture attendance within the current tranche of students.

Regarding this issue multi-media and podcasts could be of assistance, in the sense that it becomes possible to match the tertiary environment to the lifestyle choices and modalities of the Generation Y student. Marketing theory tells us that to be successful, organisations need to adapt to the needs of their clients, to expect that relationship to be inverted just because this is a tertiary education product, is frankly unrealistic, in addition the corporate entrants to the tertiary market are already using the technology to good effect.

7.2 Conclusions: Podcast impact on pass rates

Any intervention of this nature runs the risk of falling foul of the “Hawthorne effect”, where taking a special interest in an identifiable group, affects their productivity/performance. While making the material only available to the students of selected courses could potentially lead to such a result, in this instance, an attempt has been made to address this issue in the research design. By increasing the workload (making the content more current, thereby adding to the syllabus) and increasing the difficulty level of the assessment associated with the courses under review, an attempt was made to address the issue. While these factors are not specifically measurable, the researcher maintains that their existence served to counteract some, if not all, of the Hawthorne influence, indicating that the results achieved are unlikely to be only the result of the “Hawthorne effect”.

Based upon the detailed and rigorous statistical analysis of two parallel first year Economics classes, Economics 1C0 and Economics 1D0, it may be concluded that the availability of podcasted lecture content has had a positive effect on class performance. This conclusion is strengthened by the fact that the author has been solely in charge of the 1D0 module for the past five years. A careful consideration of the circumstances of the class, including the quality of the course content, the overall demographics of the students and the raised academic standard of the examination, leads the author to believe that the only effect that could account for the improvement of the class performance is the introduction of podcasting. Clearly, class performance is not just

measured by the class average. The percentage of students passing the module is also important. The pass percentage for the years under consideration for the two modules is presented below.

	2005	2006	2007	2008	2009
1C0	72	84	87	72	68
1D0	67	78	98	87	94
Variance	-5	-6	+ 11	+15	+26
% Variance	6.9	-7	12.6	20.8	38.2

Table 6 - Comparative Pass Rates

When analyzing the pass rates for the 1D0 module it is clear that apart from the understandable aberration of 2007, the pass rate in 2009 is significantly better than in the preceding years. This provides further supporting evidence for the efficacy of podcasting in improving student performance. What is even more compelling is the fact that the same group of students in the first semester doing the Micro Economics module was the weakest group under review overall. The Micro Economics had no podcast support, the same lecturers and the same entry requirement as all previous ECON1C0 groups. As course co-ordinator the author was at the time most perturbed by this trend. While previous years did indicate a variance in terms of results between semesters, possibly due to the students coming to grips with the university system, the improvement of almost 40% in terms of pass percentage between semesters in 2009 is almost double that of the highest previous group under review.

When analysing the results achieved of the first time, first year sub sample of students in ECON1D0, a similar picture develops when comparing the pass rates for those students exposed to the podcasts versus those who were not. It becomes obvious that the podcasts have a positive impact on results; when comparing the results of the 2008 and 2009 samples; the pass rate improved from 79% to 91% of the first time, first year sample and the median increased from 56 to 63 with comparable standard deviations of 11.181 and 10.126.

The results achieved indicated that all members of the sample irrespective of their educational, ethnic, social background or academic status e.g. first year or repeating student, benefitted from the availability of the podcasts. A failure rate of 6% is remarkably low for an undergraduate Economics course at UKZN. If the pass rate had been 100% this would have -

understandably - raised suspicions about standard of the tests and exams. However, as mentioned in the body of this report the standard had actually been raised as a result of the introduction of the technology, making it possible to ask application type questions based on live data available off the Internet. All of this goes to highlighting the effectiveness of the application in this particular context.

7.3 Answering the Research Question

The primary question addressed was: will access to podcasts have a statistically significant impact on the results of first time, first year students in Economics at UKZN Westville? This breaks down into 5 sub questions:

Could podcasts meet the requirements of radical constructivism, as a mode of delivery within the context of this study? The definition of radical constructivism requires that the technique be flexible enough to assist students in the construction of the cognitive structures required to embed the expected learning outcomes of the module into their personal reality, to a degree that impacts on their academic performance. In this regard, it should be noted that the test subjects were not homogenous in terms of demographics; rather they matched the overall student population of the university and therefore represented a number of races, religions, both sexes and a range of different secondary education experience dictated by the resources of the communities they were drawn from. In addition to this, they were drawn from the weakest academic group (incorporating a significant proportion of repeating students) with access to the Faculty of Management Studies in UKZN. Judging by the results achieved by the 2009 research sample, when compared with similarly skilled intakes that had not been exposed to podcasting the answer to this question would be in the affirmative, insofar as the results achieved in the exams can be taken as a measure of meeting the requirements of the theory. Obviously, to achieve a definitive answer to that question would require the construction of a research project that would track cognitive performance as it relates to the use of the theory of Economics over a number of years. Due to the fact that ECON1D0 is a terminal course this option is not open to the author. Due to the nature of the

present research study the answer to this question is, at best, speculative based on the data collected. However, it may serve as the basis for future research, based on an extensive and careful discussion of radical constructivism, followed by equally careful operationalising of the concept into questionnaire items. Ideally this would require a research project that would track student performance to at least the third year of their undergraduate studies, at which point they are expected to perform advanced analysis and draw their own conclusions about Economic policies and theories. Due to resource constraints this type of study remains a possibility for future research, but lies beyond the scope of this paper.

Do podcasts assist students to overcome the barriers to learning implied by cultural diversity?

While there were not actual language proficiency tests done by the students in the sample, they are representative of the sample used in the HESA research discussed in the body of the document. In fact UKZN contributed to the sample used that determined the shortcomings related to mathematical and language proficiency amongst first year students. Those results would indicate as many as 50% of the sample as having language difficulties and as more than 90% with mathematical difficulties, requiring assistance from the institution. At the time of the research and for the foreseeable future that support is unlikely to be forthcoming due to resource constraints, except for a small minority of the so-called B.Com.4 students, students from previously disadvantaged communities who are given additional academic support in the form of tutorials in addition to having specialised interventions aimed at correcting secondary education shortfalls in these communities and therefore extending the B. Comm. Degree over 4 years rather than the standard 3 years. The sample also experienced the complete Outcomes Based Education syllabus, which within 12 months of the research is in the process of being revised due to massive criticism mostly related to implementation failures, most especially in the previously disadvantaged communities. In the light of this, the results achieved indicate a strong positive correlation between overcoming these barriers and the use of podcasting as an addendum to lecturing. The fact that the conceptual difficulty level of the course was actually increased by including new material and relating that to current events in tests and exams lends further credence to this argument.

Should tertiary institutions adopt this mode of delivery as an addendum to formal instruction? The research indicates that the use of podcasting is beneficial to the students. The latest technological innovations simplify both the production of podcasts via products such as Podcast Producer™ and access via aggregators such as iTunes®. The combination of these innovations simplifies both production and consumption to such a degree that with very little practice the impact on staff and students in terms of time management issues is minimal. The impact on results achieved and the freeing up of academic time for research more than compensates for the investment of time in setting up the podcasts for a course. The fact that this research was targeted at students of Economics as a discipline also highlights the fact that the technology can be used across disciplines and it not limited to Information Systems & Technology. Experience in the rest of the world has indicated this to be the case, but the choice of subject served to highlight that there is little difference between South African students and students in the developed world in this regard. In the developed world to a large degree podcasting has become the norm for most courses in those institutions that have implemented the equipment and provided the support in the form of server capacity. The similarity to social networking and edutainment in the sense that it is a simple to use technology for students has been effectively demonstrated in this research study by the uptake of the second round as opposed to the first round of podcasts. The use of the dedicated server with the use of Blogs and Wikis made the process user-friendlier; in the sense that it resembled the ‘ubiquitous’ computing model that students are comfortable with. This was especially important for those students from a previously disadvantaged background who had been negatively affected by the digital divide in the first round of research. The impact was felt as follows: while these students had equivalent access, they did not have the history of extended exposure nor the opportunity for experiential learning regarding computer based products afforded to their fellows who had attended secondary schools with more resources, or alternatively grew up with computers in the home. As they represented a normal sample of the South African tertiary intake it is probable that some of these students had not had access to a stable electricity supply prior to arriving on campus, hence access to broadband and the Internet was not part of their ‘intellectual scaffolding’ when arriving at UKZN. This certainly had an impact on their ability to utilise the podcasts in the

first iteration which involved surfing to the School of IS&T website, finding the relevant folder, downloading the files (including the media player), installing the player and then viewing the files on a computer, or alternatively actively (as opposed to automatically as with ringtones) downloading the cell phone compatible versions on their phone, in the right format into the correct folder. In the light of the above the answer in the South African context is a qualified affirmative – if the institution can afford to install a dedicated server then definitely. If not, podcasts can still be done using open source capture software and hosted on normal servers that support the relevant WiKis, however, the institution will have to ensure, especially if the technology does not support Web2.0 applications such as RSS feeds, that students receive extensive training in the skills needed to access the information. Experience with the first iteration highlights the fact that should there be skills-related difficulties the students are unlikely to report them due to embarrassment. Aside from formal training, one way to overcome this might be to break classes into groups with experienced members that can serve as mentors and guides for those students who lack the prior knowledge.

Did the utilisation of the technology indicate differentials between UKZN student adoption of podcasting as a mode of delivery and that experienced in the developed world? Once the Podcast Producer™ software and associated hardware had been installed the results indicate very little. There was a differential (digital divide) prior to the installation of the ubiquitous computing model that students were comfortable with, due to skills differentials based on access to computers and broadband availability. However, there is no discernible difference between the various demographic subgroups of students in their perceived willingness to embrace the technology under the new model, if they perceive it to be useful. The overall results achieved by the 2009 group confirm this statement. In addition, this willingness to use the technology combined with the impact that it has had on student performance would indicate that the present debate around the conversion of UKZN to a dual medium institution is somewhat premature. While the author accepts that the debate is generated by the best intentions of its proponents, the results of the podcast experiment combined with the research done amongst employers by HESA would indicate that while the implementation of such an option may provide a short term solution to the

throughput problem experienced at present, (mostly attributable to failures within the secondary education system and the ill-fated OBE experiment) it would be doing the students a disservice in the long run. The impact will be felt regarding the employability of these students, and it would certainly have a negative impact on the perception of the university in the marketplace. In the final analysis, the objective of a degree in the globalised economy should be the production of a person that has a skill set that allows them to be employed anywhere in the world in their field of choice – this is implied in the contract that the university has with the student. In addition to this, quoting the university's position in the top 500 institutions in the world as a major item in the marketing of the institution would reinforce that perception. To then provide an education in a mix of two of eleven official languages of South Africa, one of which is predominantly limited to one of the nine provinces would be disingenuous to say the least. While the status of English as the language of business and the lingua franca of the Internet may be lamentable for a number of reasons, the fact remains that it is the desired outcome of the market, at least for the foreseeable future. This is the reason that China will have the largest population of English language students in the world by 2020, with 20 million new students joining the ranks every year (Coonan, 2009). As this technology seems to be able to provide students with the support they require, it would be doing the students a disservice not to attempt to use it to provide them with a level playing field.

Did the sample of respondents indicate the probability of the existence of a digital divide in the UKZN student population? The answer to this is a qualified affirmative. However, this divide is easily bridged with the correct delivery mode. This is the single most critical issue in assisting the previously disadvantaged students, as it will become more important as the university embraces the opportunities provided by digital education and the increasingly cost effective hardware and software solutions on offer in the field of education. All design of software applications need to keep this issue in mind, and it needs to be one of the core-desired outputs when briefing developers. If the solutions provided make use of the Web2.0 facilities that allow students to interact with each other and the software in a seamless and predominantly automated fashion, such that it becomes an extension of their existing use of social networking applications, they will

embrace the opportunities it provides. In actual fact, research indicates that the new generation of students will use it in ways we as the conceptualisers and developers never imagined. Related to this would be solutions such as RSS feeds that automatically upload course material such as podcasts to the mobile devices that students use once they are on campus and within the university wireless network. The entire paradigm of tertiary education is undergoing a paradigm shift and it is going to be driven from the bottom up – what UKZN as an institution has to do is adapt, as students increasingly sophisticated in the ways of the digital world, will vote with their feet. As it is, Generation Y is questioning the entire philosophical underpinning of tertiary education – the search for eternal truth and understanding, due to what they perceive as the tenuous and temporary nature of knowledge. ‘If you want to know something – Google it’ is their mantra. This has even created academic essay-writing industries, with “professional” part-time writers and researchers that are hired by fulltime students to do their assignments and theses for them – if they can afford it. The level of sophistication of these operations is such that postgraduate students in the top universities in the world employ them. Not just to write assignments, but also to generate research- and dissertation proposals. In addition, the methodology discussed in the ‘Dante’ article highlights the unintended consequences of the availability of the Internet as a resource in the hands of a sophisticated user. The writer indicates that with little or no knowledge of a specific field of research and enquiry, it is possible for a skilled user/researcher to generate a post-graduate level paper over the course of a weekend that will get his “client” a distinction, while they are out partying with their friends. The article details how these people access hyperlinks and not having access to online libraries such as JSTOR, use the abstracts and extracts published as marketing material to produce the content required to a standard acceptable to senior academics at top institutions. (Dante, 2010).

7.4 Concrete Intervention Strategies

The pivotal issue regarding implementation revolves around a number of issues:

The perception that students will stop attending lectures. Research conducted at UKZN has indicated that this is not an issue to students that attend lectures. They perceive the podcasts as an addendum to the lectures, rather than a replacement. Indeed a significant number of respondents indicated that they would miss lectures for their social value. As a result what this indicates is a need to address the perception via structured seminars to roll out the results of the research amongst academics. These results are in line with the results of similar research conducted in developed nations. In addition to this it is unlikely that institutions such as MIT would continue to use these tools if they felt they were having a negative impact on their core business.

A second issue that is relevant is a lack of sophistication regarding the use of technology by academic staff and students (Wu and Lee 1999). “As such, if the facilitators or the students suffer from inadequate competency or lack of exposure to educational technology, they would not make use of such resources well since they lack the proficiency to do so” (Benson Soong, Chan, Chua, et al, 2001). This is also a matter of perception – the process of producing a full video podcast has been simplified to the push of a button with the “heavy lifting” done in accordance with the ubiquitous computing model. Addressing this issue is also one of education and permitting staff to practice with the equipment. In addition, it is a matter of availability – once the equipment is installed in lecture venues, staff are more likely to use it. As far as the students are concerned the availability of the material will lead to experimentation and their learning curve will most probably be self generated. The sophisticated use of social networking and similar applications by students with no formal training in that regard is indicative of Generation Y’s attitude to technology.

A third issue relates to copyright; some academics are not comfortable with the idea that their material will be available in a format that can be transferred beyond the classroom. Considering that several major institutions such as M.I.T to name one, have made it a policy that their lectures be available as free downloads and the popularity of iTunesU, this position is unsustainable. There needs to be discussion with staff regarding changing their perception so that they view the technology as an opportunity to market themselves beyond the walls of the

institution – both they and the institution will benefit from this exposure. The fact is that the rest of the world will in all likelihood follow in the steps of the leading universities. In Botswana and at the Cape Technikon, where there has been significant investment and development put into sophisticated eLearning systems, the debates around copyright and intellectual property rights have been fierce; in addition the development of materials in teams further serves to complicate matters. A compromise position has been developed that seems to answer these questions without interfering with progress on the development of eLearning solutions: “A model of shared ownership can be explored where the institute retains the right to use the materials if members of the course development team should leave, and where staff have the right to use the materials developed by the team in their new environment” (Uys, Nleya, & Molelu, 2004). In addition to this, there is also the broader issue of the fact that SA is a developmental state with all the problems regarding the education of the broader mass of the population that this entails. The availability of this material to the broader community could be a boon to all. It may assist with the creation of SMMEs and contribute toward alleviating the unemployment scourge in SA.

The fourth issue may also be a perception of additional work on top of an already significant workload on academics brought about by lack of resources and “massification” of tertiary institutions. While this is true in the short run – in the long run the material exists and if done in a sufficiently modular fashion it can be used as long as it is relevant to the course under discussion. In addition, the active staff users have found the existence of a profound learning effect that has had a dramatic impact on the amount of preparation time required. Another related matter is the potential of the effect of the “long tail” nature of podcasting. In light of the Google ‘scan the planet’s books’ initiative, it might be a way for academics and ordinary people to counter-act the possibility of Google becoming ‘evil’, especially in the light of the fact that audio is so immediate. Possibly all this scanning and the associated fears of the body of human knowledge becoming privatised will come to naught – as a result of the independent actions of millions of podcasters. Certainly academics can make a major contribution due to their specialised subject knowledge, ensuring that the most important items are forever available. Universities with their privileged

access and massive storage resources have a very crucial role to play in this regard. Certainly within the African context there is significant information of a cultural nature that should be digitally preserved and possibly more importantly made available to a broader audience.

The fifth issue relates to the need for the tertiary sector to actively engage with the broader community. Within the South African context this encounters a number of pitfalls – many of them related to the failures of the primary and secondary education system for the mass of students dating back to the Apartheid regime. eLearning in all its guises is certainly a channel that will allow universities to fulfil their outreach obligations within the broader community. They can make available information that will be of benefit to for example; healthcare practitioners, police services and other service providers within the broader community. This is achieved via the process of supplying high quality, cost effective and portable training solutions, that are immediately available to the practitioner on site, which will affect the quality of service delivery.

The sixth issue, one that is unique to the South African academic milieu, relates to the outcomes that employers expect from universities in terms of graduate skills. “In terms of all basic skills - including numeracy, the ability to use new information and computer literacy - employers said they generally get less than what they expect.....South African graduates do not have the competence in spoken and written English or the oral presentation skills required by employers” (Pretorius, 2009). In the light of the above, introducing podcasting into the Economics syllabus creates the opportunities for students to be repeatedly exposed to both formally spoken English, the technical language of the field of Economics and the systematic methodology designed to instill the skills required for advanced analysis. This in turn will align the university more closely with the outcomes expected from its graduates by the private sector. While there is a call for the introduction of dual medium teaching within the tertiary sector, the results of this research in addition to the requirements of the employment market casts doubts on the “essential for the success of the student” argument behind this call to action. While the motives of the educators who are leading this charge cannot be criticized, the author feels that the long term negative effects on

the students' employability and the acceptance of the degrees earned internationally will outweigh the short term benefit to the student and the university in terms of (possibly) improved throughput rates.

The seventh issue relates to a lack of resources in the midst of 'massification'. Within the School of Economics and Finance, a lack of resources has made it difficult to run effective first and second year tutorials due to teaching loads. In addition there are issues regarding a lack of physical space on campus; there are literally not sufficient venues to run concurrent tutorials for 60 plus groups of 30 students. The podcast technology means that students have an opportunity to get assistance that is impossible under the current scenario – the timeshifting nature combined with the ability to run the videos at their own speed is a further benefit. In addition to this, the human voice carries with it a heightened sense of immediacy that can be used to effectively transfer knowledge (Chan, Lee, & McLoughlin, 2006). Podcasts are a suitable medium for highlighting important information and guiding student revision and research efforts. This in turn relieves a lot of the pressure in this regard from academic staff, who have to manage their time between the demands of formal lectures, postgraduate supervision and assessment, setting and marking undergraduate and intermediate post graduate assessments, and their own research. “In the spring 2006 surveys we asked students and instructors what type of classes, if any, should incorporate podcasting. Student response showed a positive correlation between larger class sizes and student desire for podcasting, instructor responses were even stronger in favour. These patterns indicate that among evaluation participants, both students and instructors, podcasting was perceived to be a valuable tool for large-lecture courses” (Lane, 2006). A possible option is to insist that every high enrolment course have at least one section identified as a “killer module” covered by a relevant podcast and then to make this policy throughout the Faculty. Initially this will no doubt be met with resistance, however once the benefits become clear the researcher has no doubt that the roll-out will gather a momentum of its own.

The eighth issue relates to the hidden costs of tertiary education. A significant proportion of the UKZN student body is from previously disadvantaged peri-urban and rural communities, which are significantly affected by poverty. Providing material in the form of electronic media could save a student a significant amount of money related to photo copying and buying non-core textbooks.

7.5 Conceptual Reflections

Pedagogic theory and Generation Y

Discussions around pedagogical theories regarding learning highlight the fact that the technology has in effect run away from the thinking – much like the quantum computing issue at one point, where theory is lagging behind practice. The pedagogic theory that the author has encountered strikes him as somewhat incompatible with both modern methods and modern students – the development of podcasting technology has introduced an element of physical and positional flexibility that has never before existed in education – and the theory is still firmly embedded in the face-to-face chalk and talk mindset, where it is suitable - regarding distance learning - it still focuses on text-based studying at a desk to a very large degree and has not yet incorporated the effects of multi-media and portability on the studying behaviour of students. Work done on audio to a large degree assumes that the student is sitting somewhere taking notes. Certainly very little work except for that of the media theorists take cognisance of the possibility that the studying environment could be jogging through a park or in a gym while training. Mainstream theorists would certainly consider most of that work fringe. In addition the student, due to having grown up in the digital era with a different attitude to learning – experiential and trial and error, which is a consequence of the gaming culture, amongst other things, has little patience for the time honoured scientific method of instruction. Gen Y seems to be hedonistic and focused on immediate gratification and with the advent of the Net in its present guise this is becoming possible. Unfortunately, this ready access to information does lead to the possibility of accessing “bad” information and certainly at first the users lack the knowledge base required to filter out the wheat from the chaff.

“More and more students come to school with these skills. This is a language they not only understand but use, often on a daily basis. Some of them have been blogging, shooting and editing video, creating Flash animations, manipulating photographs, and recording digital audio for many years. These are the tools of their native expressiveness, and with the right guidance and assignments, they can use these tools to create powerful analytical and synthetic work. Yet even such digitally fluent students need to learn to manipulate their multimedia languages well, with conceptual and critical acumen, and we in higher education do them a disservice if we exclude their creative digital tools from their education” (Cambell, 2005).

In a sense this implies that we need a new education model where educators become facilitators that can reach beyond the classroom to where the actual studying is being done. It is in this context that podcasting can be of greatest benefit, both to the student and the instructor.

From a teaching perspective the ‘shamanistic’ phenomena (pp14) discussed by McLuhan, (1964), regarding the absorption of information in an uncritical fashion could be a threat, or an opportunity – it depends on the level of analysis that one wishes to inculcate to the listener. At a first year level where the basics of the language of a subject are taught and the relationships under discussion are introduced to the student it may be a boon. However, at a later stage in the student’s evolution where they are expected to think analytically and critically, the use of this technology may well be a problem – especially if the student comes across a podcaster that combines a non-scientific belief system with a charismatic delivery. The theory holds this could colour their entire worldview. However, in the context of this research it must be remembered we are not using sound only and a large number of our students at present do not have mobile devices. In addition, the most compelling counter-argument goes that by combining both visual and auditory stimulus using Podcast Producer™, the author dilutes the possibility of creating a bunch of proto-cavemen that are incapable of original thought by providing a clearly defined space (e.g. visual stimulus) that counter-acts the undifferentiated whole, which is what provides the ‘power’ of the purely auditory.

However, if we were to accept the argument, it does mean that the moment the student dons headphones and starts to move we again have to deal with the potential of this effect.

Evuleocha and Ugbah (2007) indicate that there is a fundamental break between Gen Y and previous generations in the way that they access and value information. They do not even consider computers to be technology; “they have always been there”. As a result the existing philosophy of education – face to face and the gradual collection of knowledge is considered to be of little value to a generation that sees knowledge as something that you source as you require it in real time - ‘Google it’ - and being of a transitory nature due to the pace of progress that they are accustomed to. In the light of these facts podcasting is a better “match” to the lifestyle of the Gen Y’er due to the fact that it fits into the portable multi-tasking nature of their relationship to each other and the world around them. In a sense the push technology which means the information is at their fingertips with minimal effort and can then be disposed of at will is the perfect solution for a generation that have become the ultimate consumers in a disposable culture. In the light of the current situation the author personally believes that this enquiry into new forms of pedagogic theory will lag behind implementation and experimentation by the students for the foreseeable future – due to the nature of the Gen Y’er attitude to technology they will embrace new methods within their social milieu and use it for an extended period prior to the formal education sector even becoming aware of it. In addition they will not see it as an opportunity to publish as to their way of thinking that is of transitory value. This might in fact be one of the core reasons (aside from the obvious financial) at the base of the difficulty that the tertiary sector in South Africa is experiencing in attracting post-graduate students. However, the above does not imply that we must discard all learning theory and start from a ‘tabula rasa’.

The above is a very important issue – and if anything the most compelling argument – Web2.0 with its social networking tools, bandwidth support and new multimedia focus, provides the platform for the next major paradigm shift in tertiary education – a method that is more inclusive and more personal than we could ever achieve using the existing 19th century modality and 5th century tools. Just the numbers of students make the old ways just that – old. Students are

used to being the centre of a multimedia universe of targeted communications from marketers, advertisers and the media – it is essential that the education paradigm adapt to the new reality or it will become obsolete and be rejected by the Google generation, who see no real purpose in studying “STUFF” that they won’t need for their jobs – which for a significant percentage of them, do not exist today. This does not mean that we reject the model of careful focussed study and the application of the scientific method on a wholesale basis – it is what brought us to this point. However, we as educators need to become more open to change and accepting of the new realities that the technology has created, and embrace it as an opportunity, rather than viewing it as a threat.

Should there be an Education Policy regarding the development of a Nguni Language Web?

Discussions by Warschauer (2000) *et al* regarding the dominance of the Anglo-Saxon Web has inevitably overflowed into the political arena and within an African and particularly South African context the above issue becomes a possible bone of contention. Should such a policy develop as a result of the non-binary thinking related to the digital divide e.g. that the problem is no longer about the haves and the have nots, but rather around “we have but we want it in our own language and with a ‘look and feel’ that reflects our culture.” This newer thinking could conceivably lead to the development of Intra-Nationalist conflict over resources, Home Language Internet Development in this case, within the South African context. With 11 official languages all clamouring for equal recognition, if there were an official policy introduced to promote Home Language Digital Development in the form of websites etc. the possibility for a struggle for resources does exist. Due to the delicate nature of the status of official languages in South Africa the best policy would be no policy, letting the Nguni Language Web develop by itself, organically. For the time being, the author feels the most logical approach would be to assist students in attaining a level of digital literacy in English that will allow them to access the large mass of resources available on the web currently. Should users then feel a need to develop this into a Nguni Language resource for cultural reasons they will have the skills, tools and information resources to do so.

7.6 Recommendations for Future Study

The results of this research indicate conclusively that there are no barriers to the use of the technology on the demand side in relation to student attitudes to the use of these solutions. In addition the results also indicate that these interventions will have no discernible impact on lecture attendance, in line with the results achieved in the developed nations. However, the paper does highlight the fact that there are still negative perceptions on the part of academic staff on these exact issues. Therefore what the paper highlights is a need for further research to determine the cause of these perceptions as well as the dissemination of research results that highlight the positive results achieved to date using the technology as a means to address these perceptions.

Lau *et al.* (2010) have done research into blended learning using, amongst other methods, student produced podcasts and course materials to investigate the impact that it has on student commitment. Due to the high level of non-attendance informally reported to the author by academics from numerous fields, this would be a suitable topic for further investigation within the South African context. Research seems to indicate that the students in the developed world are moving further away from the traditional ‘chalk and talk’ model of tertiary education, and this seems to be influenced by their usage of technology. Research furthermore indicates that the developed world leads by approximately 4 – 7 years in terms of technology and connectivity, therefore these issues are bound to become more immediate within the South African education milieu in the near future. This research study has highlighted that there is in effect very little difference between students in the developed and developing world once systems have been put in place to allow the operation of technology in a way that the students are comfortable with. It is obviously not feasible to run these types of tests on first year students due to the effects of the secondary schooling digital divide, however, it is conceivable to develop these types of interventions for third year or post graduate students.

The development of an integrated online solution for supporting Economics students is a possibility now that UKZN is in the process of rolling out the Moodle platform. This will provide a web-based open source platform capable of being used in a number of innovative ways. The author

is doing preliminary investigations into how this system can be used to combine podcasts with relevant exercises and online interactive simulations as a means to entice students to go beyond the minimum required in their study of Economics. The author feels that this may contribute to enticing students back into the class if the course is designed in such a way that students have to use the resource and attend lectures, a situation that is causing grave concern among UKZN lecturing staff. It is also essential to involve interactive application design in line with a more broadly constructivist pedagogic philosophy than the current research design, which while suited to what is expected in terms of first year outcomes, falls short of the skills related to analysis and integration expected of more senior students.

In a more broadly “social responsibility” intervention the author intends to combine the use of Podcasts with the free textbooks available from sites such as www.bookboon.com in an attempt to lower the financial burden on students from previously disadvantaged communities. In an ideal world this would be combined with making available to students devices such as the \$35 Indian wireless iPad-type device. Funding would obviously be a major determinant in this proposal as UKZN does not at present have access to the resources that would be required. Even for a small course such as ECON1C0/ECON1D0, which is about to be expanded to 250 students, incorporating the so-called B.Com4 group, the cost would be in the order of R 250 000.00. However, this proposal holds the potential for levelling the playing field for these students in terms of language, mathematical ability and overcoming the effects of the digital divide. Regarding these issues, this type of innovation could be the basis of a research project that assesses the impact this type of intervention has on results when combined with HESA type testing to identify ‘at risk’ students at the outset of a module, and then tracking their performance vs. the performance predicted by the HESA model. In the short term this may be a relatively expensive exercise but it will certainly be less disruptive to the overall running of the institution than the introduction of dual medium teaching and it will mean that the millions invested in the wireless campus project will benefit those students that need it most. The present research project indicates definitively that the proper use of technology (even in the relatively limited scope used) has a significant impact on

the performance of UKZN students. This in turn converts into improved throughput rates, which improves the institution's cash flow, provides access to more students within a specified time period as the incumbent crop of students moves through the tertiary system in the required time frame and avoids the possible negative impact that going to a dual medium institution could have on the perception of the quality of the institution's qualifications.

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Glossary of Terms

Blog – refers to an online journal. The term blog comes from web log.

Digital Divide – refers to the particular skills and competency involved in becoming literate in the digital age, (including access to ICT) and the impact of this digital literacy in creating the marginalization of culturally and linguistically diverse learners.

Edutainment – entertainment that is intended to be educational

e-Learning – refers to the use of ICT infrastructure and software applications in a number of different formats, both open source and proprietary to assist in pedagogic endeavours at all levels.

Massification – a term coined to describe the exponential growth of enrolment in Australian universities that resulted in student numbers quadrupling in the 15 years leading up to the Millennium.

Multi Media - media and content that utilises a combination of different content forms, for example, a PowerPoint presentation with a synchronised voice-over.

Podcast - a portmanteau of Apple's iPod and "broadcasting", is a method of publishing files to the Internet, allowing users to subscribe to a feed and receive new files automatically, usually at no cost. It first became popular in late 2004, used largely for audio files.

Prosumer – a portmanteau formed by contracting the word professional or producer with the word consumer.

Tagging - a non-hierarchical keyword assigned to a piece of information – it is metadata that is used to describe an item such as a Podcast file.

Ubiquitous Computing – a post-desktop model of computing in which information processing has been integrated into everyday objects and activities – users engage many computational devices and systems simultaneously and may not even be aware of the fact.

Vodcast – essentially a podcast with a video component.

Web 2.0 – is associated with web applications that facilitate interactive information sharing, interoperability, user-centered design and collaboration on the World Wide Web. A Web 2.0 site gives its users the free choice to interact or collaborate with each other in a social media dialogue as creators (prosumers) of user-generated content in a virtual community, in contrast to websites where users (consumers) are limited to the passive viewing of content that was created for them. Examples of Web 2.0 include social-networking sites, blogs, wikis, video-sharing sites, hosted services, web applications, mashups and

folksonomies. (WiKipedia.org/wiki/Web_2.0)

Wiki - a website, on the Internet proper or on an intranet that allows the users to develop documents in a collaborative setting. It allows for the creation and editing of interlinked web pages via a web browser which effectively allows non programmers to build a hierarchy of knowledge on a specialised server. The most well known Wiki is Wikipedia (www.wikipedia.org) a Web-based encyclopedia that allows anyone to add or edit entries.

APPENDIX 1

Podcast Production Technical Recommendations

Microphone Technique Best Practice: central to all forms of podcasting and vodcasting.

- From a purely technical perspective, the recording of sound requires that the presenter be aware of the limitations of microphones. If the presenter is involved in producing a screen capture or purely audio podcast, that is not a live presentation the presenter does not require a studio environment. It is preferable to use a boom microphone as this remains in place in relation to the presenter's mouth. Set it up so that it is in line with the bottom of the presenter's chin to prevent 'heavy breathing' and popping.
- If the presenter is doing a live recording of a lecture it is preferable to use a lapel mike, but these also have limitations. The best practice is to place it in the centre of the presenter's chest and for that person to remain aware of it. Should the presenter wish to address a question from the audience, s/he should turn their torso and not just their head as it will affect the recording levels of the mike.
- When using a handheld mike, the presenter should hold it approximately halfway between his/her sternum and mouth while talking over the top of the mike, these devices are extremely sensitive, and used this way will not give the popping effect that one hears so often when microphones are passed around venues for Q&A sessions.
- When using a podium mike, adjust the height with the sound turned off if possible, then turn the mike on and test for sound by tapping the mike – again blowing into the device can possibly damage it and possibly the hearing of a person wearing headphones.
- The presenter should lower the pitch of his/her voice, most people do this subconsciously when talking on the telephone, use the same technique when using a microphone.
- Use your voice as a means of drawing attention to the more important or complex parts of the topic under discussion. Research has shown that a person who understands a complex topic and verbally describes it to a listener gives vocal signals that assist the listener with understanding the concept.

Adapted from: Ms. Marjorie Brooks-Morris, Radio and Television Presenter

Content and Context.

- Do not obviously read from a script – the audience is used to listening to professional voices. While scripting is essential from a perspective of staying on topic, reading it is not the best option. The author finds that using a boom mike allows him to talk at the ceiling or the wall in his office, and he uses the slides on the monitor (when in screen capture mode) for direction but consciously does not read them. If possible the best results are achieved if the presenter imagines they are giving a live lecture.
- Focus on a topic, and if the presenter is using vodcasting e.g. screen capture, find a video clip that demonstrates the central idea – it does not have to be academic, actually considering the audience, preferably not.
- Refrain from long podcasts, try to limit the production to a maximum of 10 minutes, even that long only if essential to the discussion. Remember the podcast has to be downloaded or streamed and this uses resources, both financial and bandwidth. This is difficult in a lecture scenario but can be achieved with post production editing, which is fairly simple to do, alternatively the presenter can briefly stop the lecture between concepts, stop and upload the file and start the next recording – with the more sophisticated products on the market this can be done in less than a minute.
- Use the Wikis to guide your students when searching for information – it is unlikely that they will use every podcast, different students encounter difficulties with different sections of a course. Do not be offended if some podcasts remain ignored on the server.
- Podcasts are not an alternative to classes, but should rather be thought of as an addendum to lectures. For example, pre-class podcasts can prepare students with background information allowing the lecturer to make better use of class time. As a result it becomes possible to use class time to engage in discussions and collaborative learning activities. This is possibly more useful for post graduate courses. In addition you can direct your students to podcasts made in other institutions on the same topics, allowing them to make comparisons with the local syllabus.

- Don't duplicate material available as lecture notes and textbooks, or material that you will cover in class. Focus on salient points and in the case of a subject such as Economics work through examples of problems using the relevant theory.
- "Don't podcast just for the sake of it: consider its suitability for the subject/topic and target audience.
- Think of ways to use the technology to empower learners to generate their own podcasts on relevant topics – the ease of production makes this a simple matter.
- Recording live lectures has the upside of capturing classroom discussions and student contributions, while it has the downside of not being 'perfect'. The venue also has to be wired for sound to allow the capture of audience member contributions.
- As an Institution, provide adequate technical support so that users can focus their attention on teaching/learning, creativity and knowledge construction rather than troubleshooting the technology. Take steps to ensure that the technology does not become a distracter. Fortunately the new generation of Podcast Producer™ software is of such a nature that the only input is pushing a button to start, another button to stop and a last button to publish the finished product to the relevant Wiki – it would be preferable to attach a metadata tag as a descriptor.
- If you decide to let the students become active producers, provide gradually decreasing levels of assistance to them as they learn how to produce their own podcasts. In the early stages you might supply students with a script or script outline to work with as a starting point. As they build experience and confidence, allow them to not only modify the scripts and improvise while presenting, but also to take the initiative to come up with their own ideas and scripts.
- Don't underestimate the importance of sound project management and planning, and emphasise this to your producers" (Chan, Lee, & McLoughlin, 2006)

Adapted from: Chan Lee & McLoughlin (Chan, Lee, & McLoughlin, Everyone's learning with podcasting: A Charles Sturt University experience., 2006)

APPENDIX 2

Breakdown of self-reporting respondents – ECON102 2008

Identifier	Race	Test 1	Test 2	Test 3	Final Term Mark	ITS Final Mark
208001	w	0	41	34	42	42
208002	i	74.5	37	58	66	60
208003	i	84.8	34	10	59	40
208004	b	51.7	46	32.7	49	42
208005	b	71	65	60.7	68	64
208006	b	75.9	46	42	61	50
208007	i	87.6	55	48	71	60
208008	b	91.7	35	64	78	65
208009	b	75.2	34	56.7	66	60
208010	i	84.1	77	60	81	67
208011	i	79.3	77	80	80	80
208012	b	73.1	59	54	66	70
208013	b	95.9	44	36.7	70	54
208014	w	83.4	64	63.3	74	70
208015	w	91.7	96	54.7	94	85
208016	b	47.6	38	10	43	33
208017	i	48.3	28	13.3	38	50
208018	w	89	67	72.7	81	83
208019	b	83.4	42	36.7	63	58
208020	i	25.5	36	6.7	31	21
208021	b	72.4	53	69.3	71	67
208022	w	100	66	40	83	70
208023	w	59.3	42	15.3	51	43
208024	b	71	73	44.7	72	65
208025	i	51	36	36.7	44	38
208026	i	91.7	75	68	83	76
208027	i	87.6	48	44.7	68	54
208028	b	34.5	39	24	37	45
208029	b	49	61	60.7	61	54
208030	i	73.8	54	46.7	64	59
208031	b	79.3	49	40	64	52
208032	w	0	52	34	43	50
208033	w	33.8	26	21.3	30	34
208034	b	79.3	69	64	74	70
208035	b	83.4	46	36	65	67
208036	b	58.6	37	48	53	52
208037	w	47.6	28	31.3	39	41

APPENDIX 3

Research Questionnaire – ECON102 & ECON1D0 2009

Student Name (Optional) _____

Student registration Number (Optional) _____

Researcher's Name: Professor M S Maharaj

If you wish to remain anonymous, please indicate the date and month of your birth:

(for audit purposes): Date: _____

Month: _____

This research is aimed at the School of IS&T building up a profile of the technology readiness of students at UKZN for the roll-out of a Podcasting solution for the School and University. Your responses will be used for these purposes only and will not in any way prejudice you. Your cooperation in this exercise is greatly appreciated and will help us make your learning experience a better one. Please answer as many of the questions as accurately as possible.

Section A: Demographic Data (Please tick the appropriate block and fill in where required)

1. Gender	Male	
	Female	
2. Year of Study	1	
	2	
	3	
	4 (for a four year undergraduate degree)	
	Post Graduate	
3. Proposed / Completed / Current Majors		
4. Race	African	
	Coloured	
	Indian	
	White	
	Other	
	I do not wish to answer	
5. Age	Age < 18	
	18 < age <= 19	
	19 < age <= 20	
	20 < age <= 21	
	21 < age	

6. Do you own an MP3 / MP4 player? Please tick all that apply.	No – not interested in getting one	
	No – I would like to have one	
	Yes – iPod	
	Yes – other brand	
	Yes – on my mobile phone	
	Yes – on my home computer	
	Yes – on my laptop computer	
7. Please indicate which definition you think best describes the term “podcasting”. Choose only one. There is no “wrong answer”.	Podcasting is the process of capturing a mix of sounds and video and then posting the mix to a website or “blog” that can be downloaded to any suitable device for playback.	
	Audio/video content available on the internet that can be automatically delivered to your iPod only.	
	Podcasting is an asynchronous mode of distributing multimedia files over the internet for playback on iPods at the user’s convenience	
	Podcasting describes the process of using a portable MP3 player to play content from the web using Apple technology only.	
	Post Graduate	
Section B: Podcasting of Lectures		
8. Do you listen to podcasts?	No – I did not know that they exist	
	No – I do not have the equipment	
	No – I do not know how to	
	No – I do not see the value in this	
	No – I do not know where to find them	
	Yes – UKZN educational podcasts	
	Yes – Music podcasts	
	Yes – Educational podcasts that I download	
	Other (Yes/No) – Please specify:	
9. Podcasting sounds like an expensive exercise and will be out of reach for most students	Yes	
	No	
	I don’t know	
10. Do you receive lecture material electronically (online), for any module	Yes	
	No	
	Don’t know	

11. Do you think that it s a good idea to have lecture material available online?	Yes	
	No	
	Don't know	
12. Approximately how many hours, on average, of lectures are you scheduled to attend each week?		
13. Approximately how many hours, on average, of lectures do you attend each week?		
14. If you attend significantly fewer lectures than you should, the reason is?	Not applicable – I attend most of my lectures	
	The lecturer does not add any value to my life as a student	
	I use the online lecture notes – I do not need to attend lectures	
	I find it difficult to understand the lecturer	
	The lecture schedule is too tight for me to be able to attend all.	
	I need some time to unwind – I have to miss some lectures for this.	
	Other - Please specify:	
15. If recordings of lectures were made available online, would you still attend lectures?	Yes – Interaction with the lecture is important	
	Yes – There may be additional information given in class	
	Yes – I enjoy attending lectures	
	Yes – It is important to get to know the lecturer and for him/her to get to know me	
	Yes – Social interaction is important	
	No – All that I need will be in the recording	
	No – The examination is directly from the lectures and information will be available in the recording	
	Other (Yes/No) – Please specify	

16. What do you believe will be the things you would miss most should podcasts replace lectures	Meeting new friends, social interaction	
	Interaction with the lecturer	
	Additional information not available on the online notes/recording will be missed	
	The opportunity to interact with the lecturer	
	I need lectures to keep me more focused on my work	
	Other – Please specify:	
17. How do you think that you would make use of recorded lectures.	I will not use recorded lectures at all	
	As an additional resource to my notes that I take at the lectures	
	It will free me from taking detailed notes and concentrate on what the lecturer is saying	
18. eLearning and its related technologies is the trend and must be adopted by our University	Strongly Agree	
	Agree	
	Neutral	
	Disagree	
	Strongly Disagree	
19. I look forward to being able to access my lectures online at my convenience	Strongly Agree	
	Agree	
	Neutral	
	Disagree	
	Strongly Disagree	
20. The ability to participate in multi-dimensional learning will allow me to improve my results	Strongly Agree	
	Agree	
	Neutral	
	Disagree	
	Strongly Disagree	

This questionnaire was adapted from “Student’s Attitudes Towards Using Podcasts in Higher Education,” by Shakila Gajasinghe, a dissertation submitted to the University of Loughborough, 2007.

Thank you for your assistance and for taking your time to answer these questions.

Sincerely

Prof. M S Maharaj

APPENDIX 4

Student Results: Elementary Macroeconomics – First Time, First Year

ECON1DO 2005

Identifier		Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
F-F	2005001	62	50.7	32	56	53	54	54
F-F	2005002	85.3	68	44	77	54	63	63
F-F	2005003	62.7	76	55	69	63	65	65
F-F	2005004	66.7	66	42	66	57	61	61
F-F	2005005	70	54.7	64	67	65	66	66
F-F	2005006	72.7	70.7	38	72	72	72	72
F-F	2005007	50		36	43	59	53	53
F-F	2005008	80	80	50	80	70	75	75
F-F	2005009	66.7	56	45	61	44	51	51
F-F	2005010	69.3	76.7		73	37	51	51
F-F	2005011	72	56	61	67	63	65	65

ECON1DO 2006

No Data

ECON1DO 2007

No Data

ECON1DO 2008

Identifier		Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
F-F	2008001	51	52	53.6	53	54	54	54
F-F	2008002	44	41	46.4	45	39	41	41
F-F	2008003	56	71	66.4	69	63	65	65
F-F	2008004	34	67	90.4	79	64	70	70
F-F	2008005	48	54	71.2	63	52	56	56
F-F	2008006	33	34	57.6	46	45	45	45
F-F	2008007	40	53	68.8	61	32	44	44
F-F	2008008	59	61		60	71	67	67
F-F	2008009	77	70		74	45	57	57
F-F	2008010	54	59	56.8	58	57	57	57
F-F	2008011	36	35		36	17	25	25
F-F	2008012	53	51	66.4	60	62	61	61
F-F	2008013							
F-F	2008014	56	67	72.8	70	67	68	68
F-F	2008015	47	39	40	44	44	44	44
F-F	2008016	72	71	66.4	72	66	68	68
F-F	2008017	43	47	61.6	54	45	50	50
F-F	2008018	53	38	36	46	48	47	47
F-F	2008019	58	55	42.4	57	50	53	53
F-F	2008020	67	21	80.8	74	44	56	56
F-F	2008021	66	38	42.4	54	46	50	50
F-F	2008022	76	80	56.8	78	69	73	73

Identifier		Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
F-F	2008023	58	28	82.4	70	44	54	54
F-F	2008024	80		80.8	80	78	79	79
F-F	2008025	18	31		25	32	29	29
F-F	2008026	59	76		68	53	59	59
F-F	2008027	58	52	72.8	65	52	57	57
F-F	2008028	54	51	66.4	60	57	58	58
F-F	2008029	53	51	76	65	64	64	64
F-F	2008030	74	58		66	59	62	62
F-F	2008031	53	32	60	57	50	53	53
F-F	2008032	44	48	57.6	53	44	48	48
F-F	2008033	58	71	68	70	72	71	71
F-F	2008034	39	34	62.4	51	53	52	52
F-F	2008035	50	54	47.2	52	48	50	50
F-F	2008036	48	47		48	56	53	53
F-F	2008037	55	53	76	66	51	57	57
F-F	2008038	78	67	76	77	60	67	67
F-F	2008039							
F-F	2008040	49	59	81.6	70	42	53	53

ECON1D0 2009

Identifier		Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
F-F	2009001	65	65	52	65	61	63	63
F-F	2009002	64	61	51.3	63	66	65	65
F-F	2009003	64	43	64	64	56	59	59
F-F	2009004	65	52	48.7	59	55	57	57
F-F	2009005	69	65	56	67	53	59	59
F-F	2009006	62	65	56	64	62	63	63
F-F	2009007	65	80	60	73	72	72	72
F-F	2009008	90	66	81.3	86	67	75	75
F-F	2009009	76	37	64	70	45	55	55
F-F	2009010	59	53	56	58	63	61	61
F-F	2009011	32	30	46	39	37	40	40
F-F	2009012	76	86	64	81	66	72	72
F-F	2009013	56	38		47	24	33	33
F-F	2009014	75	EX	76	76	53	62	62
F-F	2009015	76	67	76	76	62	68	68
F-F	2009016	53	38	48	51	36	42	42
F-F	2009017	56	65	56	61	56	58	58
F-F	2009018	73	67	65.3	70	53	60	60
F-F	2009019							
F-F	2009020	79	72	100	90	87	88	88
F-F	2009021	79	83	52	81	52	64	64
F-F	2009022	78	56	64	71	58	63	63
F-F	2009023		65	22	44	56	51	51
F-F	2009024	63	35	56	60	49	53	53
F-F	2009025	86	59	40.7	73	58	64	64
F-F	2009026	55	56	30	56	58	57	57
F-F	2009027	84	42	80	82	72	76	76
F-F	2009028			8	4			
F-F	2009029	78	37	52	65	55	59	59

Identifier		Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
F-F	2009030	77	72	68	75	70	72	72
F-F	2009031	66	61	30	64	51	56	56
F-F	2009032	85	59	68	77	73	75	75
F-F	2009033	69	66	96	83	70	75	75
F-F	2009034	87	60	59.3	74	59	65	65
F-F	2009035	84	54	52	69	55	61	61
F-F	2009036	65	43		54	39	45	45
F-F	2009037	75	86		81	69	75	75
F-F	2009038	63	62	74	69	69	70	70
F-F	2009039	61	52	92.7	77	61	67	67
F-F	2009040	54	56	60.7	58	57	57	57
F-F	2009041	79	69	68	74	63	67	67
F-F	2009042	74	46	56	65	44	52	52
F-F	2009043	42	55	68	62	50	55	55
F-F	2009044	40	70	50	60	59	60	60
F-F	2009045	86	67	73.3	80	60	68	68
F-F	2009046	54	9	44	49	52	51	51
F-F	2009047	60	58	76	68	60	63	63
F-F	2009048	79	84		82	67	73	73
F-F	2009049	76		68	72	74	73	73
F-F	2009050	69	49	46.7	59	52	55	55
F-F	2009051	80	74		77	62	68	68
F-F	2009052	28		40.7	34			
F-F	2009053	52	42	0.7	47	45	46	46
F-F	2009054	77	74		76	65	69	69
F-F	2009055							
F-F	2009056	78	65	76	77	65	70	70
F-F	2009057	49	61	80	71	58	63	63
F-F	2009058	52	52	84.7	68	58	62	62
F-F	2009059		66	65.3	66	74	71	71

APPENDIX 5

Statistical Analysis First Time, First Year students.

Analysis of Means:

ECON1D0 2008			Number of observations = 38	
	Mean	Std.Err	(95% Confidence Interval)	
	55.71053	1.813851	52.03532	59.38574

ECON1D0 2009			Number of observations = 55	
	Mean	Std.Err	(95% Confidence Interval)	
	62.23636	1.365512	59.49868	64.97405

The means are significantly different using a 95% confidence interval.

Two-sample t test with unequal variances

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
var1	38	55.71053	1.813851	11.18133	52.03532	59.38574
var2	55	62.23636	1.365512	10.12691	59.49868	64.97405
combined	93	59.56989	1.140073	10.99446	57.30561	61.83418
diff		-6.525837	2.270391		-11.04925	-2.002429

diff = mean(var1) - mean(var2) t = -2.8743
 Ho: diff = 0 Satterthwaite's degrees of freedom = 74.4406

Ha: diff < 0
 Pr(T < t) = 0.0026

Ha: diff != 0
 Pr(|T| > |t|) = 0.0053

Ha: diff > 0
 Pr(T > t) = 0.9974

The means are significantly different using a 95% confidence interval.

Variance ratio test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
var1	38	55.71053	1.813851	11.18133	52.03532	59.38574
var2	55	62.23636	1.365512	10.12691	59.49868	64.97405
combined	93	59.56989	1.140073	10.99446	57.30561	61.83418

ratio = sd(var1) / sd(var2) f = 1.2191
 Ho: ratio = 1 degrees of freedom = 37, 54

Ha: ratio < 1
 Pr(F < f) = 0.7502

Ha: ratio != 1
 2*Pr(F > f) = 0.4996

Ha: ratio > 1
 Pr(F > f) = 0.2498

Therefore cannot reject the null hypothesis of equality of variances across the 2 samples.

APPENDIX 6

Student Results: Elementary Microeconomics – All Students

ECON1CO 2005

Identifier	Final Term Mark	Internal Exam 1	Final Mark	ITS Final Mark
2005001	60	48	53	53
2005002	63	25	40	40
2005003	73	63	67	67
2005004	64	61	62	62
2005005	70	67	68	68
2005006	64	63	63	63
2005007				
2005008	69	57	62	62
2005009	51	45	47	47
2005010	62	58	60	60
2005011	79	67	72	72
2005012	62	62	62	62
2005013	43	48	46	46
2005014	69	53	59	59
2005015	50	29	37	37
2005016	68	47	55	55
2005017	34			
2005018	54	55	55	55
2005019	65	42	51	51
2005020	36			
2005021	58			
2005022	92	75	81	81
2005023	63	61	62	62
2005024	72	69	70	70
2005025	42			
2005026	88	73	78	78
2005027	55	52	53	53
2005028	74	52	61	61
2005029	44	31	36	36
2005030	83	70	75	75
2005031	71	49	58	58
2005032	78	63	69	69
2005033	83	79	81	81
2005034	73	53	61	61
2005035	56	55	55	55
2005036	42	63	55	55
2005037	52			51
2005038	68	43	53	53
2005039	65	46	54	54
2005040	41	23	30	30
2005041	57	45	50	50
2005042	61	48	53	53
2005043	18	26	23	23
2005044	56	38	45	45
2005045	45	40	42	42
2005046	37	28	32	32
2005047	38	67	55	55
2005048	61	55	57	57

Identifier	Final Term Mark	Internal Exam 1	Final Mark	ITS Final Mark
2005049	69	42	53	53
2005050	45	46	46	46
2005051	39	46	43	43
2005052	25			
2005053	55	49	51	51
2005054	81	59	68	68
2005055	52	50	51	51
2005056	41	48	45	45
2005057	32	32	32	32
2005058	55	24	36	36
2005059	64	65	65	65
2005060	67	33	47	47
2005061	61	54	57	57
2005062	58	37	45	45
2005063				
2005064		48	14	55
2005065	61	50	54	54
2005066	35			
2005067				
2005068	59	45	51	51
2005069	44	62	55	55
2005070	51	38	43	43
2005071	40	30	34	34
2005072	78	66	71	71
2005073	60	65	63	63
2005074	66	69	68	68
2005075	75	68	71	71
2005076	65	68	66	66
2005077	88	80	83	83
2005078	62	69	66	66

ECON1CO 2006

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2006001	51		80	66	70	68	68
2006002		45	43	44	58	52	52
2006003	83	55	56	70	58	63	63
2006004							50
2006005	43	40	35	42	62	54	54
2006006		42	43	43	46	45	45
2006007	60	53	10	57	64	61	61
2006008			10	5	33	22	22
2006009	51	48	33	50	48	50	50
2006010	72	54	14	63	47	53	53
2006011			10	5	51	33	33
2006012	69	61	20	65	48	55	55
2006013			52	26	59	46	46
2006014							57
2006015	58	44	28	51	55	53	53
2006016	75		39	57	60	59	59
2006017	75		47	61	43	50	50
2006018							51
2006019	83	64	42	74	51	60	60
2006020	67	39	73	70	59	63	63
2006021		51	26	39	58	50	50
2006022	75	55		65	38	50	50
2006023	49	32	31	41	46	44	44
2006024	87	43	73	80	64	70	70
2006025	77	36	20	57	51	53	53
2006026	78	62	35	70	51	59	59
2006027	66	45		56	51	53	53
2006028	77	39	23	58	38	46	46
2006029	46	51	23	49	54	52	52
2006030	63	33	6	48	39	43	43
2006031	91		48	70	77	74	75
2006032	82	87	45	85	79	81	81
2006033	94		40	67	64	65	65
2006034	75	42	58	67	58	62	62
2006035	76	73		75	52	61	61
2006036	86	82		84	67	75	75
2006037	67	48	58	63	56	59	59
2006038	78	66		72	61	65	65
2006039	71	51		61	41	50	50
2006040	40		42	41	62	54	54
2006041	86		70	78	87	83	83
2006042	55	36	43	49	48	48	48
2006043	72	46	45	59	70	66	66
2006044	77		40	59	62	61	61
2006045	65	55	44	60	76	70	70
2006046	56			28			
2006047	89	57	56	73	58	64	64
2006048	44		31	38	27	31	31
2006049	59	59	52	59	48	52	52

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2006050	63	66	28	65	56	60	60
2006051	82	43	45	64	66	65	65
2006052	56	24	48	52	48	50	50
2006053	82		55	69	77	74	75
2006054			65	33	79	61	61
2006055			80	40	80	64	64
2006056	55	47		51	58	55	55
2006057	55	47	35	51	68	61	61

ECON1CO 2007

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2007001	80	42	18.4	61	48	53	53
2007002			47.2	24	15	19	19
2007003	70	62	66.4	68	64	66	66
2007004	73	52	85.6	79	61	68	68
2007005	66	49	35.2	58	26	40	40
2007006	75	61	37.6	68	68	68	68
2007007	69	71	61.6	70	42	53	53
2007008	81	50	68	75	44	56	56
2007009		46	61.6	54	45	50	50
2007010	80	70	61.6	75	44	56	56
2007011							48
2007012	42		44.8	43	62	54	54
2007013	68	41	68.8	68	42	52	52
2007014	70	54	48	62	65	64	65
2007015	77		85.6	81	65	71	71
2007016	65	41	13.6	53	37	43	43
2007017	56	67		62	24	40	40
2007018	89	80	95.2	92	72	80	80
2007019	66	84	72	78	62	68	68
2007020	64	87	40	76	53	62	62
2007021	69	67	100	85	65	73	73
2007022	62	61	76.8	69	63	65	65
2007023	76	44	58.4	67	70	69	69
2007024	83	65	67.2	75	58	65	65
2007025	68	75	68.8	72	57	63	63
2007026	67	48	72.8	70	42	53	53
2007027	47	51	52.8	52	47	50	50
2007028	72	48	62.4	67	68	68	68
2007029	56	30	52.8	54	47	50	50
2007030	75	78	81.6	80	58	67	67
2007031	71	81	90.4	86	71	77	77
2007032	57	74	56.8	66	56	60	60
2007033	67	85	59.2	76	52	62	62
2007034	44	69	85.6	77	29	48	50
2007035	66	55	80.8	73	50	59	59
2007036	43	49	57.6	53	38	44	44
2007037	79	66	86.4	83	66	73	73
2007038	75	33	95.2	85	56	68	68
2007039	65	60	66.4	66	66	66	66

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2007040	68	84	77.6	81	52	64	64
2007041	70	60	82.4	76	73	74	75
2007042	63	65		64	43	51	51
2007043	65	75	72	74	61	66	66
2007044	70	83	57.6	77	59	66	66
2007045	75	61		68	52	58	58
2007046	62	50	73.6	68	78	74	75
2007047	72	75		74	66	69	69
2007048	67	69	56.8	68	61	64	64
2007049	64	65		65	68	67	67
2007050	85	48		67	68	68	68
2007051	57	41	67.2	62	44	51	51
2007052	48	48	77.6	63	37	47	47
2007053	79	75	80.8	80	70	74	75
2007054	39	55	64.8	60	62	61	61
2007055	60	65	12	63	40	50	50
2007056	58	55	90.4	74	62	67	67
2007057	72	70	56.8	71	59	64	64
2007058	71	65		68	43	53	53
2007059	67		54.4	61	49	54	54
2007060	66	60	86.4	76	67	71	71
2007061	39		36.8	38			
2007062	59	55	53.6	57	60	59	59
2007063	62	55	40	59	44	50	50
2007064	68	63	77.6	73	70	71	71
2007065	59	73	52	66	54	59	59
2007066	53			27	49	40	40
2007067	45	56	38.4	51	44	47	47
2007068	59	60	37.6	60	44	50	50
2007069	58	40	61.6	60	43	50	50
2007070	60	70	90.4	80	77	78	78
2007071	81	51	76	79	48	60	60
2007072	54	35	86.4	70	42	53	53
2007073	67	30	95.2	81	50	62	62
2007074	65	49	23.2	57	48	52	52
2007075	52	51	46.4	52	38	44	44
2007076	66	45	61.6	64	66	65	65
2007077	74	91	91.2	91	64	75	75
2007078	93	91		92	53	69	69
2007079	71	69	81.6	76	68	71	71
2007080	48	37	82.4	65	45	53	53
2007081	55	46	66.4	61	35	45	45
2007082	58	27	90.4	74	65	69	69
2007083	77	75	76	77	55	64	64
2007084	68	61		65	42	51	51

ECON1C0 2008

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2008001		53	35	44	54	50	50
2008002	54	8	75	65	22	40	40
2008003	73	52	37	63	53	57	57
2008004	90	72		81	73	76	76
2008005	70	58	41	64	43	51	51
2008006	73	23	85	79	37	54	54
2008007	76	76		76	53	62	62
2008008	51	48	72	62	30	43	43
2008009	86	90	50	88	72	78	78
2008010		45	75	60	27	40	40
2008011	91	86	61	89	72	79	79
2008012	69	71	53	70	67	68	68
2008013	95	73	46	84	51	64	64
2008014	83	76	71	80	63	70	70
2008015	72	83	70	78	50	61	61
2008016	60	75	57	68	67	67	67
2008017	78	81	66	80	68	73	73
2008018		83	57	70	72	71	71
2008019	72	50	32	61	68	65	65
2008020	78	90	56	84	70	76	76
2008021			25	13	25	20	20
2008022	82	83		83	46	61	61
2008023	78		51	65	82	75	75
2008024		42	68	55	45	50	50
2008025	80		86	83	42	58	58
2008026	76	45		61	60	60	60
2008027	67		85	76	42	56	56
2008028	55	75		65	56	60	60
2008029	82	90	70	86	68	75	75
2008030	74	60	60	67	48	56	56
2008031	78	76	85	82	73	77	77
2008032	85	72		79	54	64	64
2008033	77	70	85	81	56	66	66
2008034	72	72		72	52	60	60
2008035	53	30	37	45	45	45	45
2008036	77	56		67	26	42	42
2008037	68	69	27	69	58	62	62
2008038	54	39	82	68	52	58	58
2008039					19	11	11
2008040	75	68	77	76	51	61	61
2008041	47	36	46	47	41	43	43
2008042	60	40	43	52	39	44	44
2008043	70	54	35	62	25	40	40
2008044	93	94	80	94	83	87	87
2008045	55	39	71	63	53	57	57
2008046	79	96		88	63	73	73
2008047	70	54	15	62	57	59	59
2008048	47	39	14	43	40	41	41
2008049	72	58	27	65	38	50	50
2008050	90	84	29	87	72	78	78
2008051	63	38	95	79	46	59	59

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2008052	78	59	66	72	52	60	60
2008053	76	70	80	78	54	64	64
2008054	83	89		86	70	76	76
2008055	80		75	78	84	82	82
2008056	85	70		78	59	67	67
2008057	63	66	58	65	53	58	58
2008058	37	26	81	59	35	45	45
2008059	80	91	80	86	68	75	75
2008060	77	88	85	87	72	78	78
2008061	77	72	21	75	51	61	61
2008062	67	27	60	64	31	44	44
2008063	38	49	61	55	46	50	50
2008064	65	71	70	71	59	64	64
2008065	59	83	70	77	56	64	64
2008066	56	40	42	49	40	44	44
2008067	58	22	34	46	40	42	42
2008068							
2008069	72	39	16	56	45	50	50
2008070	67	50	90	79	66	71	71
2008071	74	49	35	62	33	45	45
2008072	69	39	80	75	56	64	64
2008073	77	35	16	56	37	45	45
2008074		3	20	12	30	23	23
2008075	68	39	21	54	42	47	47
2008076	47	56	0	52	34	41	41
2008077	50	45	76	63	36	47	47
2008078	71	70	45	71	36	50	50
2008079	79	77	85	82	81	81	81
2008080	67	38	17	53	39	45	45
2008081	80	62	95	88	72	78	78
2008082	58	45	50	54	21	34	34
2008083		28	30	29	29	29	29
2008084	54	47	51	53	46	50	50
2008085	60	44	44	52	34	41	41
2008086	69	51	75	72	46	56	56
2008087	57	29	71	64	50	56	56
2008088	75	50	67	71	45	55	55
2008089	77	56	32	67	44	53	53
2008090	79	57	17	68	41	52	52
2008091	67	50	40	59	54	56	56

ECON1CO 2009

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2009001		64	65	65	64	64	64
2009002	58	39	15	49	40	44	44
2009003							71
2009004	80	80	45	80	68	73	73
2009005	42	36	63	53	52	52	52
2009006	74	54	90	82	61	69	69
2009007	12	24	37	31	42	38	38

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2009008	79	46	76	78	46	59	59
2009009	61	39	25	50	44	46	46
2009010	57	56	40	57	49	52	52
2009011	17	23	50	37	46	42	42
2009012	79	76	90	85	51	65	65
2009013	80	63	95	88	68	76	76
2009014		33	40	37	25	30	30
2009015	71	39	36	55	55	55	55
2009016	63	49	90	77	60	67	67
2009017	50	39	57	54	61	58	58
2009018	63		86	75	58	65	65
2009019	72	57	58	65	59	61	61
2009020	66	41	86	76	56	64	64
2009021	50	34	48	49	40	44	44
2009022	66	67	62	67	49	56	56
2009023	65	52	60	63	56	59	59
2009024		38	15	27	44	37	37
2009025	73		37	55	70	64	64
2009026	47	58	34	53	56	55	55
2009027	59	53	52	56	46	50	50
2009028	60	37	60	60	45	51	51
2009029	72	65		69	51	58	58
2009030	70	33	71	71	42	54	54
2009031	50	61	46	56	46	50	50
2009032	46	48	21	47	52	50	50
2009033		60	41	51	61	57	57
2009034	42	22	60	51	49	50	50
2009035	69	79	88	84	66	73	73
2009036	47	49	40	48	58	54	54
2009037	54	34	48	51	41	45	45
2009038	14	58	55	57	34	43	43
2009039	72	3	50	61	68	65	65
2009040	69	43	56	63	56	59	59
2009041	76	64	43	70	70	70	70
2009042	76	76	75	76	70	72	72
2009043	72	60	35	66	50	56	56
2009044	68	66	55	67	61	63	63
2009045	67	53	83	75	43	56	56
2009046	56	58	85	72	66	68	68
2009047	59	48	65	62	54	57	57
2009048	72	64	100	86	67	75	75
2009049	69	51	75	72	55	62	62
2009050	85	66	54	76	58	65	65
2009051	63		71	67	32	46	46
2009052	41	50	63	57	62	60	60
2009053	61	49	60	61	50	54	54
2009054	49	51	46	50	39	43	43
2009055	38	58	40	49	55	53	53
2009056	76	54	59	68	49	57	57
2009057	28	47	59	53	56	55	55
2009058	42	51	51	51	49	50	50
2009059	67	39	25	53	28	38	38
2009060	50	53	57	55	50	52	52

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2009061	28	39	72	56	26	38	38
2009062	30	59	80	70	39	51	51
2009063	35	29	44	40	60	52	52
2009064	37		21	29	41	36	36
2009065	76	73	95	86	63	72	72
2009066	43	46	42	45	45	45	45
2009067	67	54	85	76	52	62	62
2009068	52	68		60	50	54	54
2009069	43	67	35	55	42	47	47
2009070	35	32	52	44	41	42	42
2009071	25	23	31	28	38	34	34
2009072	46	40	77	62	35	46	46
2009073	37	54	85	70	73	72	72
2009074	55	39	15	47	57	53	53
2009075	27	32	63	48	51	50	50
2009076	7	19	65	42	31	35	35
2009077	25		55	40	18	27	27
2009078	65	69	95	82	82	82	82
2009079	37	31		34	29	31	31
2009080	29			15	25	21	21
2009081	61	48	47	55	30	40	40
2009082	51	44	32	48	48	50	50
2009083	50	23	65	58	30	41	41
2009084	58	41	55	57	46	50	50
2009085	62	36	47	55	48	51	51
2009086	60	58	61	61	75	69	69
2009087	55	60	44	58	39	47	47
2009088	42	50	71	61	43	50	50
2009089	71	41	31	56	59	58	58
2009090	29	43	46	45	44	44	44
2009091	55	69	51	62	66	64	64
2009092	49	53	60	57	50	53	53
2009093	72	58	40	65	69	67	67
2009094	43	18	60	52	52	52	52
2009095	78	67		73	68	70	70
2009096	41	35	48	45	45	45	45
2009097	54	42	27	48	42	44	44
2009098	48	45	26	47	27	35	35
2009099	66	20	75	71	44	55	55
2009100	36	27	70	53	49	51	51
2009101	43	58	70	64	52	57	57
2009102	72	43	35	58	32	42	42
2009103	53	43	46	50	56	54	54
2009104	65	60	30	63	61	62	62
2009105	42	34	15	38	34	36	36
2009106	78	56	45	67	63	65	65
2009107	33		20	27			
2009108	16		70	43	30	35	35
2009109	33	41	91	66	51	57	57
2009110	36	57	36	47	49	50	50
2009111	32	26	59	46	44	45	45
2009112	12	13	22	18	48	36	36

Student Results: Elementary Macroeconomics – All Students

ECON1DO 2005

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2005001				31	23	26	26
2005002							
2005003		52	35	44	44	44	44
2005004	76		60	68	77	75	75
2005005	47.3	36	62	55	58	57	57
2005006	58	44		51	46	48	48
2005007	49.3		75	62	39	48	48
2005008	76	64		70	73	72	72
2005009	75.3	47.3	30	61	56	60	60
2005010	57.3	40	65	61	47	53	53
2005011	61.3	36	60	61	48	53	53
2005012	24			12	35	26	26
2005013			57	29	53	43	43
2005014					44	26	26
2005015	50	70.7	56	63	40	50	50
2005016	72.7		38	55	45	50	50
2005017	51.3	48.7	61	56	54	55	55
2005018	23.3	48.7		36	31	33	33
2005019	76.7	44	55	66	65	65	65
2005020	76	72		74	64	68	68
2005021							
2005022	68	52		60	49	53	53
2005023	67.3	70		69	50	58	58
2005024	76	76.7		76	57	65	65
2005025	48	80.7	51	66	52	58	58
2005026	70	66	58	68	57	61	61
2005027	48	63.3	62	63	40	50	50
2005028	52	84	55	70	53	60	60
2005029	54.7	54.7		55	47	50	50
2005030	58		57	58	49	53	53
2005031	53.3	54.7		54	33	41	41
2005032	20	39.3		30	43	38	38
2005033							
2005034	61.3	65.3		63	43	51	51
2005035	56.7	44	40	50	44	46	46
2005036		28	30	29	20	24	24
2005037	41.3		47	44	42	43	43
2005038	52.7	62.7		58	55	56	56
2005039	47.3	66	75	71	58	63	63
2005040	56	10	66	61	37	47	47
2005041							
2005042	33.3		31	32	37	35	35
2005043	56		46	51	42	46	46
2005044							
2005045	44.7	40	40	42	48	46	46
2005046	60	42.7	75	68	43	53	53
2005047	69.3	36.7	40	55	48	51	51
2005048	64	55	64	64	65	65	65
2005049		39.3	22	31	38	35	35

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2005050	62	50.7	32	56	53	54	54
2005051	85.3	68	44	77	54	63	63
2005052	62.7	76	55	69	63	65	65
2005053	66.7	66	42	66	57	61	61
2005054	70	54.7	64	67	65	66	66
2005055	72.7	70.7	38	72	72	72	72
2005056	50		36	43	59	53	53
2005057	80	80	50	80	70	75	75
2005058	66.7	56	45	61	44	51	51
2005059	69.3	76.7		73	37	51	51
2005060	72	56	61	67	63	65	65

ECON1D0 2006

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2006001				29	29	29	29
2006002	60	67	40	64	49	55	55
2006003	60	34	35.8	48	59	55	55
2006004	55		60	58	44	50	50
2006005	70	34	11.6	52	55	54	54
2006006	47	62	35.8	55	58	57	57
2006007	19			10			
2006008	51	74		63	63	63	63
2006009	52		40	46	40	42	42
2006010	61	72	41.1	67	58	62	62
2006011	71			36	46	42	42
2006012		60	36.8	48	59	55	55
2006013	61	49		55	40	46	46
2006014	74	66		70	51	59	59
2006015	59	59		59	37	46	46
2006016	26	63	48.4	56	59	58	58
2006017	80	63	69.5	75	64	68	68
2006018	89	73		81	61	69	69
2006019		63	50.5	57	62	60	60
2006020	77	66		72	70	71	71
2006021	48	76	30.5	62	65	64	64
2006022							
2006023	59	47		53	60	57	57
2006024	73	48		61	49	54	54
2006025	76	41	11.1	59	49	53	53
2006026	71	71	28.4	71	52	60	60
2006027	67	60	50.5	64	48	54	54
2006028	84	73	38.4	79	63	69	69
2006029	72	61		67	70	69	69
2006030	66	71		69	60	64	64
2006031	57			29	26	27	27
2006032	63	40	17.9	52	46	48	48
2006033	69	40		55	51	53	53
2006034	47	58	36.3	53	45	48	48
2006035	80	63		72	52	60	60
2006036	68	65	41.6	67	49	56	56

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2006037	49	68	34.7	59	54	56	56
2006038	59	31		45	45	45	45
2006039	68	70	51.6	69	52	59	59
2006040	65	57	34.7	61	53	56	56
2006041	46	61	41.6	54	62	59	59
2006042	69	49	47.9	59	61	60	60
2006043	75		14.7	45	51	50	50
2006044	91	63		77	25	46	46
2006045	79		43.7	61	51	55	55
2006046	85		55.8	70	67	68	68
2006047	68	62		65	56	60	60

ECON1D0 2007

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2007001	79	82	82	82	84	83	83
2007002	80	83		82	71	75	75
2007003	85		77	81	80	80	80
2007004	80		64	72	69	70	70
2007005	82	69	64	76	69	72	72
2007006	40	71	34	56	88	75	75
2007007	88	75	48	82	82	82	82
2007008	63	72	72	72	80	77	77
2007009	79	67	64	73	74	75	75
2007010	66	75		71	63	66	66
2007011	50	60	23	55	76	68	68
2007012	80	82	64	81	72	76	76
2007013	69	69	54	69	75	73	73
2007014	75		71	73	68	70	70
2007015	83	87		85	86	86	86
2007016	73	79		76	58	65	65
2007017	77	78	29	78	66	71	71
2007018	72	70	73	73	70	71	71
2007019	84	71	40	78	75	76	76
2007020	71	54	47	63	67	65	65
2007021	82	57		70	64	66	66
2007022	89	82	76	86	70	76	76
2007023	81	76	82	82	86	84	84
2007024	77	63	34	70	71	71	71
2007025	72	76	66	74	78	76	76
2007026	87	77		82	74	77	77
2007027	93	73		83	78	80	80
2007028	79	76	66	78	74	76	76
2007029	73	64		69	60	65	65
2007030	85		58	72	82	78	78
2007031	72	73		73	77	75	75
2007032	81	74	72	78	72	75	75
2007033	40		67	54	78	68	68
2007034	17	66	48	57	66	62	62
2007035	69	66	63	68	79	75	75
2007036	84	63	70	77	80	79	79

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2007037	75	78		77	89	84	84
2007038	78	77	76	78	71	74	74
2007039	82	84		83	70	75	75
2007040	83	60	56	72	68	70	70
2007041	74		58	66	64	65	65
2007042	86	78	43	82	63	71	71
2007043	89	68		79	82	81	81
2007044	94	76		85	75	79	79
2007045	82	66	52	74	66	69	69
2007046	80	86	70	83	71	76	76
2007047	78	79	73	79	66	71	71
2007048	84	62		73	58	65	65
2007049	76	70		73	62	66	66
2007050			34	17	45	34	34
2007051		58	58	58	66	63	63
2007052	80	76		78	75	76	76
2007053	85	82	48	84	79	81	81
2007054	84	91	82	88	81	84	84
2007055	72	81	61	77	90	85	85
2007056	76	66	64	71	84	79	79
2007057	74	72	82	78	79	79	79
2007058	74	77		76	70	72	72
2007059	67	77		72	63	67	67
2007060	69	74		72	67	69	69
2007061		65	48	57	71	65	65
2007062	64		64	64	50	56	56
2007063	70	63	70	70	62	65	65
2007064	52	83	76	80	70	74	74

ECON1DO 2008

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2008001	53	51	66.4	60	46	52	52
2008002	44	36	61.6	53	47	50	50
2008003	60	72	71.2	72	60	65	65
2008004	73	85	85.6	85	69	75	75
2008005	53		62.4	58	58	58	58
2008006		52	71.2	62	57	59	59
2008007	33		76	55	70	64	64
2008008	50	56	48	53	46	50	50
2008009		59	67.2	63	61	62	62
2008010	62	72	66.4	69	66	67	67
2008011	55	53	62.4	59	53	55	55
2008012	78	59	68	73	66	69	69
2008013	85	48	72	79	67	72	72
2008014	72	80	76.8	78	63	69	69
2008015	57	77		67	44	53	53
2008016	55	70	52	63	45	52	52
2008017	56	59	80.8	70	63	66	66
2008018	45	46	62.4	54	40	46	46
2008019	88	59	71.2	80	69	73	73

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2008020	68		46.4	57	52	54	54
2008021	56	56	59.2	58	39	47	47
2008022	46	35	35.2	41	53	50	50
2008023	71	78	72.8	75	66	70	70
2008024	67	50	56.8	62	54	57	57
2008025					40	24	24
2008026	84	64	80.8	82	71	75	75
2008027	58	63	66.4	65	68	67	67
2008028	48	56	68	62	48	54	54
2008029	73	50	48	62	47	53	53
2008030	72		80.8	76	80	78	78
2008031	73	60	71.2	72	68	70	70
2008032	61	41	61.6	61	57	59	59
2008033	62	67	72	70	55	61	61
2008034	43	55		49	56	53	53
2008035	74	62	66.4	70	53	60	60
2008036	64	74	48	69	51	58	58
2008037	47	57	80.8	69	57	62	62
2008038	73	60	39.2	67	54	59	59
2008039	54	38	66.4	60	58	60	60
2008040	54	75		65	62	63	63
2008041	44	57	57.6	57	44	50	50
2008042	68	59	61.6	65	51	57	57
2008043	73	46	80.8	77	60	67	67
2008044	56	56	71.2	64	55	59	59
2008045	89	73		81	63	70	70
2008046	66	80	85.6	83			
2008047	51	52	53.6	53	54	54	54
2008048	44	41	46.4	45	39	41	41
2008049	56	71	66.4	69	63	65	65
2008050	34	67	90.4	79	64	70	70
2008051	48	54	71.2	63	52	56	56
2008052	33	34	57.6	46	45	45	45
2008053	40	53	68.8	61	32	44	44
2008054	59	61		60	71	67	67
2008055	77	70		74	45	57	57
2008056	54	59	56.8	58	57	57	57
2008057	36	35		36	17	25	25
2008058	53	51	66.4	60	62	61	61
2008059							
2008060	56	67	72.8	70	67	68	68
2008061	47	39	40	44	44	44	44
2008062	72	71	66.4	72	66	68	68
2008063	43	47	61.6	54	45	50	50
2008064	53	38	36	46	48	47	47
2008065	58	55	42.4	57	50	53	53
2008066	67	21	80.8	74	44	56	56
2008067	66	38	42.4	54	46	50	50
2008068	76	80	56.8	78	69	73	73
2008069	58	28	82.4	70	44	54	54
2008070	80		80.8	80	78	79	79
2008071	18	31		25	32	29	29
2008072	59	76		68	53	59	59

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2008073	58	52	72.8	65	52	57	57
2008074	54	51	66.4	60	57	58	58
2008075	53	51	76	65	64	64	64
2008076	74	58		66	59	62	62
2008077	53	32	60	57	50	53	53
2008078	44	48	57.6	53	44	48	48
2008079	58	71	68	70	72	71	71
2008080	39	34	62.4	51	53	52	52
2008081	50	54	47.2	52	48	50	50
2008082	48	47		48	56	53	53
2008083	55	53	76	66	51	57	57
2008084	78	67	76	77	60	67	67
2008085							
2008086	49	59	81.6	70	42	53	53

ECON1D0 2009

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2009001	85	77	56.7	81	78	79	79
2009002	85	66	92.7	89	81	84	84
2009003	83	44		64	59	61	61
2009004	55	40	56.7	56	61	60	60
2009005	76	59	50	68	61	64	64
2009006	58	68	36.7	63	63	63	63
2009007	57	54		56	50	52	52
2009008			20	10			
2009009	81	46	64.7	73	54	62	62
2009010	76	62	76	76	63	68	68
2009011	70		60	65	70	68	68
2009012	59	62	64	63	71	68	68
2009013	93	65		79	67	72	72
2009014	88	57	68	78	50	61	61
2009015	74	73	72	74	72	73	73
2009016	66	40	40	53	56	55	55
2009017	73	65	72	73	60	65	65
2009018	61	59		60	49	53	53
2009019	60	74	70.7	72	50	59	59
2009020	69	44	80	75	53	62	62
2009021	44	59	53.3	56	46	50	50
2009022	67	41	24	54	41	46	46
2009023		65	56	61	61	61	61
2009024	75	74	53.3	75	72	73	73
2009025		58	60	59	61	60	60
2009026	65	51	50	58	50	53	53
2009027	55		32	44	37	40	40
2009028							
2009029	76	57	88	82	58	68	68
2009030	71	50		61	75	70	70
2009031		58	58.7	58	61	60	60
2009032	68	47	44	58	54	56	56
2009033	89		65.3	77	56	64	64

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2009034	77	63	28.7	70	64	66	66
2009035		61	65.3	63	66	65	65
2009036	60	53	59.3	60	67	64	64
2009037	79	67	68.7	74	76	75	75
2009038	70	64	68.7	69	72	71	71
2009039	67	56	60	64	51	56	56
2009040	62	57	68	65	62	63	63
2009041	68	55	42.7	62	64	63	63
2009042	76	65	80	78	66	71	71
2009043		66	44	55	56	56	56
2009044	53	68	58.7	63	70	67	67
2009045	82	51	66.7	74	54	62	62
2009046	60	63	76	70	66	68	68
2009047	92	54	77.3	85	62	71	71
2009048	82	48	81.3	82	56	66	66
2009049	73	61	60	67	56	60	60
2009050	61	42	43.3	52	50	51	51
2009051	75	65	48	70	68	69	69
2009052		55	64	60	59	60	60
2009053	66	71	52	69	54	60	60
2009054	59	70	68	69	59	63	63
2009055	84	68	88	86	68	75	75
2009056	65	65	52	65	61	63	63
2009057	64	61	51.3	63	66	65	65
2009058	64	43	64	64	56	59	59
2009059	65	52	48.7	59	55	57	57
2009060	69	65	56	67	53	59	59
2009061	62	65	56	64	62	63	63
2009062	65	80	60	73	72	72	72
2009063	90	66	81.3	86	67	75	75
2009064	76	37	64	70	45	55	55
2009065	59	53	56	58	63	61	61
2009066	32	30	46	39	37	40	40
2009067	76	86	64	81	66	72	72
2009068	56	38		47	24	33	33
2009069	75	EX	76	76	53	62	62
2009070	76	67	76	76	62	68	68
2009071	53	38	48	51	36	42	42
2009072	56	65	56	61	56	58	58
2009073	73	67	65.3	70	53	60	60
2009074							
2009075	79	72	100	90	87	88	88
2009076	79	83	52	81	52	64	64
2009077	78	56	64	71	58	63	63
2009078		65	22	44	56	51	51
2009079	63	35	56	60	49	53	53
2009080	86	59	40.7	73	58	64	64
2009081	55	56	30	56	58	57	57
2009082	84	42	80	82	72	76	76
2009083			8	4			
2009084	78	37	52	65	55	59	59
2009085	77	72	68	75	70	72	72
2009086	66	61	30	64	51	56	56

Identifier	Test 1	Test 2	Test 3	Final Term Mark	Final Exam Mark	Final Mark	ITS Final Mark
2009087	85	59	68	77	73	75	75
2009088	69	66	96	83	70	75	75
2009089	87	60	59.3	74	59	65	65
2009090	84	54	52	69	55	61	61
2009091	65	43		54	39	45	45
2009092	75	86		81	69	75	75
2009093	63	62	74	69	69	70	70
2009094	61	52	92.7	77	61	67	67
2009095	54	56	60.7	58	57	57	57
2009096	79	69	68	74	63	67	67
2009097	74	46	56	65	44	52	52
2009098	42	55	68	62	50	55	55
2009099	40	70	50	60	59	60	60
2009100	86	67	73.3	80	60	68	68
2009101	54	9	44	49	52	51	51
2009102	60	58	76	68	60	63	63
2009103	79	84		82	67	73	73
2009104	76		68	72	74	73	73
2009105	69	49	46.7	59	52	55	55
2009106	80	74		77	62	68	68
2009107	28		40.7	34			
2009108	52	42	0.7	47	45	46	46
2009109	77	74		76	65	69	69
2009110							
2009111	78	65	76	77	65	70	70
2009112	49	61	80	71	58	63	63
2009113	52	52	84.7	68	58	62	62
2009114		66	65.3	66	74	71	71



RESEARCH OFFICE (GOVAN MBEKI CENTRE)
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19 JUNE 2008

MR. AJ DE LANGE (200302551)
ECONOMICS & FINANCE

Dear Mr. de Lange

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0181/08M

I wish to confirm that ethical clearance has been approved for the following project:

"Can "Podcasts" significantly improve first time, first year Economics Students results?"

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

Yours faithfully


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MS. PHUMELELE XIMBA

cc. Supervisor (Prof. R Kloppe)
cc. Ms. J Mazibuko