Impact Analysis of Phonecasted Lecture Summaries

by

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Abstract

Constructivist learning theory postulates the active creation of content by students encourages higher levels of retention and understanding. Phonecasting, a process involving use of a telephone to record an audio message subsequently shared publicly on the World Wide Web, is a potential constructivist use of technology for assessment currently underutilized by university faculty. The primary goal of this exploratory study was to determine whether academic achievement differs between students taught in an introductory, undergraduate health course requiring the creation of lecture summary phonecasts by students, and similar students not required to create phonecasts. Little academic research has been published to date on the impact of phonecasting in the classroom.

The dependent variable in the study was defined as final student grades in the health course and the independent variable as the nominal variable of summary lecture phonecasting. Pre-existing differences in student achievement were controlled through the use of a covariate (students' entering composite ACT scores) in an Analysis of Covariance test. The researcher used an ex post facto quantitative study and utilized a quasi-experimental, posttest-only with nonequivalent groups research design. The proposed research sample for this comparative study had 100 students in the treatment group and 257 students in the control group. Results were analyzed to determine if a significant difference in academic achievement existed between student groups in the study when differences in academic achievement were controlled through the use of a covariate.

The researcher did not find statistically significant differences in student grades between those taught in a classroom setting utilizing summary lecture phonecasting assigments and those taught in a traditional setting. When student ACT math scores were used as a covariate instead of ACT composite scores, however, statistical results were very close to statistical significance. Analysis of an instructor end-of-course student survey along with an interview with the instructor suggest multiple ways phonecasting projects and studies could be improved in the future. Summary lecture phonecasting by students is a promising pedagogic intervention and an assignment option which warrants further investigation.

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CHAPTER 1: INTRODUCTION

Background

The growing availability of mobile phones by students on U.S. college campuses and in K-12 schools offers a promising platform for teachers to utilize for learning and assessment. Mobile phone ownership by U.S. teens grew from 45% in 2004 to 85% by mid-2009 (Lenhart, 2009). While the availability of cell phones inside and outside classrooms presents a disruptive and distracting potential, it also presents opportunities for voice-based information exchange and assessment (Burns & Lohenry, 2010). Scholars have highlighted the importance of not only using mobile telecommunications devices for curricular-based learning, but also to practice a range of "new media literacy" skills with students at all levels (Jenkins, Clinton, Purushotma, Robison, and Weigel , 2006). While the availability and disruptive potential of cellular phones in educational settings are acknowledged in research as well as everyday practice, few studies to date have highlighted specific strategies for utilizing these devices to support active student learning through student-created phonecasts.

In the spring of 2009, an instructor at a 4 year college in the midwest of the United States (referred to in this study as USM) required a "phonecasting" assignment for students enrolled in her three sections of HEALTH101. HEALTH101 is a mandatory, semester-long course for all first-year, undergraduate students at the university. HEALTH101 at USM is unique from an academic standpoint because all instructors are required to teach with a common syllabus. While instructors are provided with a modicum of flexibility in creating assignments, the required

readings, quizzes, and tests in the course are consistent across all sections. As a mandatory freshman class, student performance in HEALTH101 is of higher interest to university administrators than many other courses (Dana Owens-Delong, Personal Interview, November 14, 2008).

Constructivist learning theory supports the use of "phonecasting" as a pedagogic intervention to increase student achievement. By requiring students to exercise higher order thinking in the active creation of a knowledge product, instructors can operationalize the recommendations of Benjamin Bloom's taxonomy of learning domains revised by Anderson, Krahthwahl and other scholars in 2001. The instructor's use of phonecasting as a required assignment in HEALTH101 at USM in Spring 2009 provides an opportunity for an ex-post facto, comparative analysis of final student grades to explore an expected relationship between phonecasting and student achievement.

Statement of Problem

The growing availability of cellular phones by college students and the prospect of utilizing phonecasting as a required means of assessment offer promise to improve student achievement in HEALTH101 at USM. Little empirical research has been completed to date, however, supporting the value of summary lecture phonecasting by students as a pedagogic intervention.

HEALTH101 at USM is not an "easy A course" for many first year students. Publicly reported data aggregated by MyEdu.com (formerly PickAProf.com) reveals the average grade for students in HEALTH101 varies widely by instructor

("Professor Ratings," 2010). These statistics highlight the widely distributed final grades of students enrolled in HEALTH101 at USM, which is one of the problems addressed by this study.

A second issue addressed by this study is the need to constructively leverage the availability of cellular telephones by students to support student achievement. Growing ubiquity of cellular phone access by students on many US college campuses has not generally corresponded to increased use of these mobile computing devices to support learning inside or outside the classroom (Caverly, Ward, and Caverly, 2009). The potential uses of mobile phones to personalize the curriculum and differentiate learning to meet the unique needs of individual students has been highlighted in recent research (Hartnell-Young & Vetere, 2008). In studied classrooms in Great Britain, for example, students have used mobile phones to create videos, maintain homework calendars, record portions of class lectures, conduct research online, time experiments and access files at school edited at home (Docksai, 2009).

The cases of mobile phone learning assigned and facilitated by classroom teachers remain as outliers in most US schools today, however. The situation of New York Public Schools in 2007, which banned cell phone possession by students because of their potential to add “distractions and disturbances” to the learning environment, is much more common (Zirkel, 2008). The availability, but underutilization of mobile phones to support classroom learning is, therefore, a second element of the problems addressed in this study.

The identification of specific pedagogic interventions which can be used by instructors in HEALTH101 at USM to improve student achievement using cell phones is a third challenge addressed by this study. Summary lecture phonecasting holds promise as a potential, instructional intervention, due to its support in constructivist research literature as well as the simplicity of its requirements (Airasian et al., 2000). Since 2005, a new genre of audio recording resources has been developed by commercial website developers which permit audio recording and sharing using a standard phone. Examples of website services offering phonecasting capabilities include iPadio.com, Cinchcast.com, Gabcast.com, and Gcast.com. This method of using phones (cell phones or land lines) to record and share audio online has been termed "phonecasting" (Wolf, 2007). The simplicity of phonecasting is one of its benefits: Users call a specific phone number, sometimes using a unique extension, and leave a recorded message just as they would with a voicemail system. Instead of recording an audio message locally to a privately-accessed voicemail system, however, phonecasted messages are available online either on a publicly accessible website (for which login credentials or a password are not required) or on an authenticated webpage to which access can be limited by the instructor.

Although phonecasts are relatively straightforward to create and phonecasting has been possible for several years, its utilization in classrooms (including university settings) has been limited. More academic research has been conducted and published on the topics of podcasting, vodcasting (video podcasting) and personal broadcasting than on the specific topic of phonecasting. This trend is

highlighted by a search (in October 2010) of Google Scholar for these terms. Google Scholar includes over 31,000 refereed articles including the keyword "podcasting," but only 26 including "phonecasting." A simple keyword search on EBSCOhost online library databases yields over 1400 articles on "podcasting," but just three on "phonecasting." When phones have been used to support learning in higher education settings, lecturecasting by instructors has been much more common than phonecasting by students. Yamamoto and Akahori's study of a pilot project in Japan involving the sharing of instructor audio lectures with mobile phones is an example of an empirical study involving phonecasting in higher education (2006). While limited research has been completed on the use of student-created phonecasts, more work in this area is needed to explore a possible relationship between student achievement and the use of phonecasting assignments by instructors. In the case of HEALTH101 at USM specifically, research has not been undertaken to date exploring the potential and actual benefits of this technology-enabled instructional intervention utilized by an instructor in Spring 2009.

Purpose of Study

This exploratory study was an attempt to elaborate on and clarify the link between an instructor's use of summary lecture phonecasting as a required course assignment and students' academic achievement in the course. Specifically, this study sought to use the theory of constructivism as a rationale for a hypothesis which relates the use summary lecture phonecasting to student achievement,

controlling for pre-existing academic differences for students enrolled in HEALTH101 taught by the same instructor at USM in spring 2008, fall 2008, and spring 2009. The independent variable was generally defined as the nominal variable of summary lecture phonecasting, utilized in course sections of HEALTH101 taught by the same instructor in spring 2009, but not in fall 2008 or spring 2008. The dependent variable was generally defined as the final grades earned by students in HEALTH101. The covariate of students' pre-existing academic differences was defined as students' entering ACT score, and was statistically controlled in the study.

Through this analysis, the investigator used empirical research to determine if a significant difference in student achievement levels in HEALTH101 was correlated to the use or non-use of summary lecture phonecasting as an instructional intervention. In addition to determining statistical significance, the researcher analyzed results of an instructor-provided end-of-course survey for students involved in phonecasting activities. The researcher also conducted and analyzed an interview with the instructor exploring project implementation details, results, and lessons learned.

Importance of Study

This study has potential importance for two audiences: One specific and another more general. The specific audience for whom this research has significant potential importance includes faculty and administrators at USM connected in some

way to the HEALTH101 course. Individual faculty instructors, program coordinators, university administrators and academic advisors each have a direct interest in the academic achievement of students enrolled in HEALTH101. As previously noted, this course is mandatory for all first year students. Many students are academically challenged by this course. Every semester, some students in HEALTH101 at USM earn D's and F's as their final grade in the class ("Professor Ratings," 2010). This study's findings could provide the basis for a scalable, course-wide change in the mandatory syllabus for HEALTH101 if results suggest phonecasting can be an affordable, practical, and effective instructional intervention to increase student achievement. Higher levels of student achievement in this course, and other college courses, are in the interest of all academic stakeholders. Barriers to entry for phonecasting assignments in the modern college classroom are lower today thanks to the confluence of multiple factors. These include broad access to cellular telephones by students as well as the availability of free phonecasting services from multiple vendors (Lenhart, 2009). Because of these factors and dynamics, the immediate importance and impact of this study to HEALTH101 faculty and staff could be significant.

In addition to USM faculty, staff and students connected directly to HEALTH101, this study also has potential importance more generally for educators in K-12 schools as well as other universities. As previously noted, the high levels of utilization and adoption of mobile phones by teens and college-age students presents an under-realized opportunity for oral information recording, sharing, archiving, and assessing. Since phonecasting does not require access to a specialized

"smartphone" supporting customized applications, but utilizes basic phone calling technologies, this instructional technology use has broad potential application in classrooms at all levels and in multiple contexts. Rural as well as urban schools in the US today are filled with students who increasingly possess their own cell phones (Arafeh et al., 2002). Even when students do not possess their own cell phone, most students have available access to land line phone service at home. Phone technology, or telephony technology, is ubiquitous in most US communities today.

For these reasons, this study has broad potential applicability. The identification of an instructional value for the use of phones to support deeper student thinking and learning about curricular content could be welcome news at USM and elsewhere. While the term "phonecasting" is uncommon in today's academic research literature and has not yet become part of the typical lexicon of K-12 teachers or university faculty, this technology-enabled, pedagogic intervention could become more common. Research studies like this one are potentially important if they can provide empirical support for student phonecasting initiatives, or highlight their lack of documented value and, therefore, discourage faculty from embracing these new instructional methods using technology.

Research Question and Hypothesis

This study attempted to answer the following question (HA): Does the use of student summary lecture phonecasting relate to student academic achievement, controlling for the effects of prior academic differences? The research hypothesis

(H0) for this proposed study is: There is no significant difference in final grades, as ordinal (letter grade) variables, between students taught in a classroom utilizing student summary lecture phonecasting and students taught in a traditional classroom setting.

The study compared the final HEALTH101 grades of students enrolled in spring 2009, fall 2008, and spring 2009 sections taught by the same instructor at USM. Pseudonyms were used to refer to the course and college in the midwestern United States involved in this study. The ACT scores of students when they entered the university was used as a covariate to control for prior academic differences. By only comparing HEALTH101 students taught by the same instructor, variability in instructional approaches, personalities, and other factors among the instructors teaching this course was partially controlled.

Basic Assumptions

This study assumed the final grade of students was a sufficient and appropriate measure of knowledge and achievement to evaluate differences between students taking an introductory health course utilizing student summary phonecasting and students enrolled in traditional class sections of the same course taught by the same instructor. It assumed students' composite ACT score upon entering the university is a reliable and valid measure of students' pre-existing levels of academic achievement (Koenig, 2006). It assumed the chosen instructor covered the required material of the course consistently in the semester student

summary lecture phonecasting activities were used in HEALTH101, and in previous semesters.

Limits

Limitations of Generalizability

Students enrolled in HEALTH101 at USM are not placed in course sections through a process of random assignment. Since test subjects for this ex post facto analysis were not selected via random assignment, the statistical generalizability afforded by empirical studies utilizing randomized assignment may not be applicable to this study. The students included in this study constitute a convenience sample, but have been selected for comparison to other students taught by the same instructor to minimize variability caused by individual differences among HEALTH101 instructors. Results may not be generalizable to the larger USM student population, or the population of undergraduate students in the United States at other institutions.

Sample Size

Internal and external validity may pose a problem with the sample size. The sample size of students included in this study may be a limiting factor affecting the generalizability of research results. In the spring 2009 term, when the instructor utilized student summary phonecasting as a required assignment, a total of 126 students completed HEALTH101 and received final grades from her. In the fall 2008 term, she assigned grades to 195 students in her course sections of HEALTH101. In spring 2008 she assigned final grades to 156 HEALTH101 students. These sample

sizes affected the statistical power of the study's analysis and limit the generalizability of results.

ACT Scores

Incomplete or missing data for students' entering ACT scores limited the number of subject cases available for analysis in the study. If entering ACT scores were not available for a student, that student's final score was not included in the statistical analysis since a covariate value was not available to control for pre-existing academic differences. Final numbers of students included in treatment and control groups are highlighted in Table 4 included in Chapter 3.

Another risk to internal validity, related to sample size, is that differences in pre-existing student academic ability may be incompletely represented by students' entering ACT composite scores. Student's entering ACT English, Math, Reading, and Science scores were available to the researcher in addition to the composite score, and these individual scores could be have been used instead of the composite ACT score or in addition to the composite ACT score as covariates. The researcher initially proposed using the composite ACT score as an independent, covariate controlling for prior subject differences.

Consistent Completion of Phonecasting Assignments

While each student in the instructor's spring 2009 HEALTH101 sections was required to complete a summary lecture phonecasting assignment, records were not available indicating which students in each section successfully completed this assignment. Websites including cross-posted phonecasts for each course section on

Wordpress.com as well as archived phonecasts on Gabcast.com are no longer available for review and analysis, because the website gabcast.com discontinued its phonecasting services on January 1, 2011 (Gabcast.com News, 2010). Even if these online, phonecasted files were available, however, student phonecast artifacts could not be tied to specific student scores provided by the university as de-identified tabular data. One risk to internal validity, therefore, is the assumption that the phonecasting assignment was successfully completed by all students enrolled in the instructor's spring 2009 HEALTH101 course sections. That assumption may be inaccurate in some cases. This risk is substantiated by some of the student responses to the instructor-provided end-of-course survey, summarized in Chapter 4.

Course Section Self-Selection

Since the subjects of this research study were first year undergraduate students enrolled at USM, the unique characteristics of this particular student sample may pose a risk to external validity for the study. Since HEALTH101 is a mandatory course for all USM first-year students regardless of academic major, the composition of students enrolled in each HEALTH101 section could be representative of the university undergraduates more generally. Students self-select their instructors and the meeting times of their course, however. As reflected in previously cited statistics, wide variability is present in the average grades assigned by different instructors of HEALTH101 ("Professor Ratings," 2010). The causes for this pre-existing grade variability may reflect opaque instructor selection dynamics

not readily discoverable by the researcher. Students in particular academic majors or on a particular athletic team, for instance, might tend to select a particular instructor based on peer or coach recommendations. These unknown factors present a threat to external validity and the generalizability of this research study, since the selected sample may not only fail to reasonably represent the population of undergraduate students at USM but also fail to represent the broader group of college students living in locations other than the city in the midwestern USA where this pilot phonecasting initiative was conducted.

Instructor Bias

Since the instructor introduced the treatment in this study, rather than the researcher, potential bias is present in the research design. The specific effect of this bias, if any, is unknown. Instructor bias could raise or lower student expectations, affecting student completion of the assigned summary lecture phonecasting assignment. Instructor bias could have other results on student performance unknown and undiscoverable by the researcher.

Definition of Terms

Phonecast: A phonecast is an audio recording created with a cellular or land-line telephone, saved to a web server connected to the Internet and usually accessible both via a phone number and a web browser for listening. Some U.S. patent applications define a phonecast as a noun when referring to a web feed accessed via a phone connected to the public switched telephone network or the Internet via voice over Internet protocol, and a verb when referring to the transmission of a web

feed over those networks (Kaufman et al., 2008). To technically qualify as a "phonecast," direct links to audio recordings must be saved within an RSS feed or other web feed which can be syndicated / subscribed to with a news reader or aggregator. Phonecasting services may be tied to a particular phone number (like iPadio.com) uniquely authorized to publish or "phonecast" on that channel, or require entry of a unique numeric extension which serves as a password for the account. "Phonecasting" is the process of creating a phonecast using a phone and a phonecasting service. Examples of phonecasting services (as of November 2011) include iPadio.com, Cinchcast.com, Yodio.com and Communityphonecast.com. Gabcast.com, Gcast.com, and Drop.io are examples phonecasting services available in 2009 which have been discontinued.

Cross-post: "Cross-posting" is a process through which content from one website is copied and posted by an automated means to another website. Cross-posting is most common on blog sites which support the use of application programming interfaces (APIs) facilitating interaction between different software programs. Cross-posting can be setup in phonecasting applications so media content created with a phone and saved to a phonecasting website (like Gabcast.com) is cross-posted or auto-posted to a blog website (like Wordpress.com.) Cross-posting may be preferable for additional functions offered to users by different websites, including commenting. Automated cross-posting of phonecasts recorded on Gabcast.com to free class blogs on Wordpress.com was utilized by the instructor in the pilot project at USM evaluated in this study.

HEALTH101: The undergraduate course “”Health101” is required for all first year / freshman students enrolled at USM, in the midwest of the United States. Health101 is a pseudonym for an actual health course at the midwestern university referred to as “USM” in this study.

Podcasting: Podcasting is the online publication of digital files (usually in audio or video formats) linked within a web feed, and the optional use of a podcatcher or “podcasting client” software to subscribe to the published channel of content. Audio or video files posted online, but not linked with a web feed complying with an acknowledged specification like RSS or ATOM, are technically not “podcasts.” A subscribable web feed, linked to regularly published content, is required for online media to be defined as a “podcast.” Most podcast files can alternatively be consumed (listened to or viewed) using an Internet web browser.

Podcatcher: A podcatcher is a client-based computer software program which downloads podcast files and permits “subscriptions” to specific podcast channels. Once subscribed, podcatchers automatically download new podcast episodes when they are published. iTunes is a popular podcatcher, but many other programs are available as podcatchers ("List of podcatchers," n.d.).

Web browser: A computer program used for accessing content shared on the Internet’s World Wide Web. Examples include Internet Explorer, FireFox, Safari and Chrome.

Web Feed: A feed, or web feed, refers to a text-based document accessible online which conforms to the published standards of the World Wide Web Consortium

(W3C.) These standards are specified on validator.w3.org/feed/docs/ and include the ATOM as well as RSS specifications.

CHAPTER 2: LITERATURE REVIEW

Constructivist Learning Theories

The benefits of active learning have been known for centuries. The advent of public schools based on ideals of factory production during the industrial revolution, however, led to a predominant paradigm of active teaching and passive learning in many classrooms (Schlechty, 1999). Writing in the early twentieth century, John Dewey challenged educational leaders to change predominant models of teaching to embrace more differentiated, student-centered and active contexts for learning (Aycock, Jackson & Simpson, 2004). In many ways, the availability of digital computing technologies as well as digital curriculum provides opportunities for Dewey's vision of customized education and active learning to be operationalized more fully in schools than ever (Dewey, 1916). Pathways for realizing Dewey's vision of engaged, personalized learning in today's digital information landscape involves elements of pedagogy as well as technology (Lehmann, 2008). Computers, software programs, and digital curriculum resources can provide customized content for learning, but pedagogic challenges remain for teachers who must find ways to help students meaningfully engage with content and thereby construct their own understanding of presented material (Freire, 1999, p. 33).

In his writings about education and learning, John Dewey explored the interactions which occur between experiences and thoughts. In "Experience in Education," Dewey observed traditional, customary, and familiar ways of presenting information and ideas to students in schools are not uniformly educative (1998). He

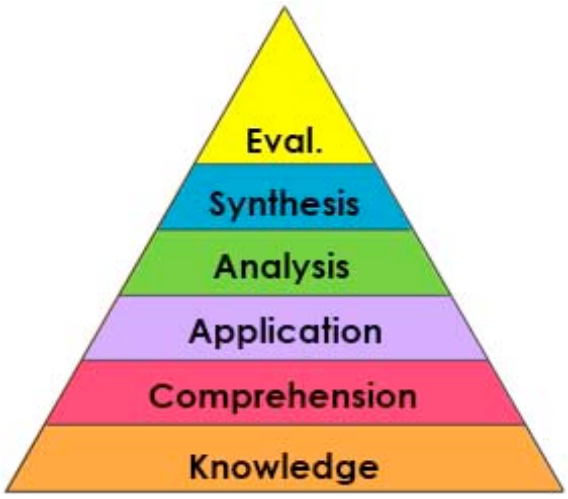
challenged teachers to provide students with novel opportunities to experience ideas and thereby learn through them in authentic ways.

In his book "How We Think," Dewey encouraged teachers to find ways for students to explore, process and utilize ideas in settings which encourage play and invention rather than passive listening or watching (1910). Active learning, according to Dewey, engages the unconscious as well as the conscious mind and can lead to more educative experiences made powerful by their context. Viewed with these lenses, summary phonecasting has potential to provide students with novel experiences as they organize and communicate their understanding of concepts to others. If students are challenged to synthesize ideas, apply and connect them to their own pre-existing knowledge schemas, students are more likely to not only remember but learn from those experiences. While Dewey certainly did not write about or have personal experience with phonecasting as a technology, his educational philosophy supports the use of phonecasting when students are encouraged to creatively communicate and connect their learning to their own experiences which are previously grounded outside classroom interactions.

Lev Vygotsky and Jean Piaget were well known developmental psychologists whose theories emphasized the importance of collaboration and imitation for learning and social development. Vygotsky emphasized social processes which contribute to development. While Piaget emphasized independent learning and "children as scientists" constantly testing their world, he also highlighted learning which occurs as the result of interaction primarily with peers rather than adults. For both Vygotsky and Piaget, knowledge and learning can be understood as socially

invented or constructed (Tudge & Winterhoff, 1993). The developmental theories of both Vygotsky and Piaget support constructivist approaches to learning which involve interaction between and among students to make sense of new information together.

Benjamin Bloom's 1956 publication, "The Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain" established a framework for educators seeking to better understand types of knowledge as well as effective learning strategies for various educational contexts (Furst et al., 1969). This foundational framework for understanding learning and instruction was revised in 2000 to focus specifically on the need for active learning as well as the importance of the creative process in promoting retention, transfer, and the development of higher order thinking skills. Each primary word of the framework was changed from a noun to a gerund during this process of revision, illustrated in the following diagrams from Overbaugh and Schultz (n.d.).



Old Version

New Version

Contributors to the revised Bloom's taxonomy maintain when students are challenged to create and share content based on their understanding of a curricular topic, there is a better chance they will not only acquire a knowledge and comprehension level understanding about their subject, but also engage in higher order thinking as they apply, analyze, and evaluate information (Airasian et al., 2000). This active process can not only promote retention, or remembering, but also transfer, defined as the application of learning "to solve new problems, to answer new questions, or to facilitate learning new subject matter" (Mayer and Wittrock, 1996). This finding led researchers publishing the new Bloom's taxonomy to place "Creating" at the top of their revised framework for learning, teaching and assessing. This pedagogic principle can serve as a guide to educators at different levels creating learning tasks for students in various subject areas.

While it has been common for teachers to require students to create written summaries of presented material for decades, in classrooms where slates and chalk

or paper and pencils have been ubiquitous learning tools, it has here-to-fore been uncommon for teachers to require students to create and submit audio recordings of their own ideas. Mechanically recorded audio technologies have been available to support learning since their invention in the mid 1850s (Morton, 1998). Despite this availability, many teachers in the United States mainly utilize audio as well as video technologies to play back existing recordings rather than create new ones. Many school leaders have been slow to embrace the learning opportunities and platforms afforded by Internet access and new technology resources at home as well as at school (Arafeh et al., 2002). As cell phones have become increasingly ubiquitous in our society, and particularly among young people, the advent of phonecasting offers new possibilities for learning tasks as well as assessments reflecting the pinnacle of the revised Bloom's taxonomy: The act of creating.

Simply including a phonecasting task or other creative assignment in a course syllabus does not guarantee students will engage in higher order thinking, however. Walter Doyle theorized academic work in school is defined primarily by the academic tasks in which students regularly engage (1983). Doyle differentiated between memory and comprehension tasks as academic work and highlighted different strategies required to process information for each. Doyle developed a 2 x 2 framework for academic tasks which can be utilized to compare relative levels of ambiguity and risk involved in different student assignments (1979). He observed tasks which "involve understanding and higher level cognitive processes are difficult for teachers and students to accomplish in classrooms… [because] students face ambiguity and risk generated by the accountability system (1983, p. 186).

These classroom tasks involving higher order thinking are inherently more difficult for teachers to manage in the classroom, and are far less common in many schools than direct instruction which involves highly structured tasks with fewer requirements for students to organize and interpret information.

Constructivist approaches to teaching can foster deeper learning and better prepare students to apply information and knowledge in new contexts. Brooks and Brooks cite NAEP (National Assessment of Educational Progress) and TIMSS (Third International Mathematics and Science Study) test results as showing how classroom practices focused specifically on test preparation fail to prepare students to transfer learning into new environments (1999). One of the key strategies Brooks and Brooks encourage constructivist teachers to utilize to increase depth of learning is "seeking and valuing students points of view." By including student perceptions as well as knowledge with instructor-provided information, classroom learning experiences can build upon students' schema (pre-existing knowledge) and transfer more readily to different contexts.

Technology Use and Student Achievement

Despite the persistent claims of some educational technology vendors to the contrary, the mere use of educational technologies has not been consistently correlated with increased levels of student achievement in schools. Schacter's meta-analysis of studies (1999) concluded simple technology use in the classroom does not correlate to increased student achievement levels. In another meta-analysis of

studies in the 1990s analyzing the impact of broader access to technology in the classroom, Cuban concluded no credit for enhanced efficiency in learning and teaching measured by academic achievement can be confidently attributed to greater computer access at school (2002).

The consistent failure of access to computers or the generic "use of computers" to positively correlate to increased student achievement in rigorous studies is closely tied to the ways these technologies have historically been utilized in schools. Christensen, Horn & Johnson (2008) termed the use of computers to "sustain and marginally improve the way they [educators] already teach and run their schools" as "cramming" (p. 72). Utilizing computer technologies in ways which replicate traditional means of instruction has historically been normative in schools. In this way, potentially disruptive technologies have been co-opted to support traditional methods of content delivery and assessment (Papert, 1993, p. 39).

While simple access to technology in the classroom has not been consistently shown to have a positive impact on student achievement or to disrupt traditional paradigms of instructionist learning, studies of the ways new technologies are utilized in classrooms have more frequently found positive effects. Karena O'Riordan's summary of Schacter's 1999 report (n.d.) concluded pedagogy, rather than technology, is the key factor affecting changes in student achievement through an educational intervention. This conclusion was supported and further articulated through nine strategies identified to improve student achievement by Marzano, Pickering and Pollock (2001). Sandifer (2009) identified a variety of web-based tools which can be used to implement these research-supported strategies to

improve student achievement. It is up to classroom teachers and instructors, however, to implement these learning strategies.

Churches (2008) has also explored ways interactive technology resources can be employed to support active learning within the framework offered by the revised Blooms Taxonomy. Just as the revised Bloom's taxonomy utilizes verbs to describe desired cognitive activities for learners, Churches expands "key terms" under the activity "creating" to include programming, filming, video blogging, wiki-ing, and podcasting. These activities support an active, hands-on approach to learning with technology which contrasts starkly with traditionally instructionist uses of passive content delivery and consumption by students more common in U.S. schools.

Although it represents a relatively simple means of creating content within this framework, student lecture summary phonecasting can provide opportunities for students to actively engage in remembering, understanding, applying, analyzing, and evaluating as they are CREATING using a telephone. Following the pedagogical suggestions of Sandifer (2009), Churches (2008), and Marzano et al. (2001), instructors utilizing phonecasting as an assignment or activity for students can reasonably expect to improve student achievement. In light of academic research, this expectation should be based not on the simple utilization of technologies, but rather as a result of the active, cognitive tasks which assignments require of students which have historically improved learning outcomes.

Lecturecasting and Podcasting

Instructor Created Lecturecasts

Although lecturecasting was not utilized in the course sections of HEALTH101 examined in this study, it is worthwhile to define lecturecasting and explore some of the research literature on this topic as well as podcasting more generally. Lecturecasting and podcasting have, to date, been more common and more frequently utilized in schools (mostly universities) than phonecasts. Important similarities and differences between these forms of digital sharing are relevant to the present study.

Lecturecasts, or coursecasts, are audio and/or video recordings of face-to-face class meetings shared online in a variety of digital formats. If shared files are linked within a web feed, aggregated media artifacts can constitute a podcast or vodcast. A vodcast is a podcast channel containing exclusively video files. In contrast to the student summary lecture phonecasts which are the focus of this study, lecturecasts are entirely instructor-created and do not involve active student participation. Hürst and Waizenegger (2006) and Norman (2004) identify two basic categories or forms for educational podcasts: repetitive (i.e., recording lectures, including lecture slides and demonstrations) and supplemental (i.e., providing material like interviews with external resources.) While student-created podcasts can fit into this "supplemental" category, the majority of educational podcasting use (arguably like much educational technology use) remains teacher/instructor generated and, therefore, didactic in nature.

Lecturecasts can take different forms. Some lecturecasts are audio-only, while others include a video track. Video elements of lecturecasts can include multimedia slides shared by presenters, video of the presenter in class (a "talking head" video) or a combination of elements.

Several cognitive learning theories relate to the provision and utility of lecturecasts. Dual-coding theory (Paivio, 1996) postulates the human brain processes visual stimuli on a separate channel from audio stimuli. Research by Mayer (2009) and others builds on dual-coding theory and supports the provision of instructional content in both visual and aural (audio) formats to enhance retention. Multimedia learning theory in general supports lecturecasting which integrates video and audio, rather than audio-only recordings. Because audio lecturecasts only provide sensory input in one information processing channel, rather than two as in the case of visual media, this theory of cognition and learning predicts audio-only lecturecasting will be less effective and valuable for students than lecturecasting with rich media files including visual components (Mayer, 2009).

Empirical studies of student use of instructor-provided lecturecasts indicate audio-only formats are preferred in some cases, however. A 2006 pilot study (Brittain et al.) with dentistry students at the University of Michigan found two-thirds preferred to download and listen to audio-only podcasts compared with video podcasts which included instructor-provided PowerPoint slides.

Whether theoretical or empirical support exists for student lecturecast preferences, a critical metric to consider is whether students actually utilize provided lecturecast files to support their own learning. German computer science

students studied by Hurst, Welte, and Jung (2007) reported a wide variety of preferences for their uses of lecturecasts, which were provided both online and on CD in a higher resolution format. Over one-third of the students (N=77, 37.4%) did not own a mobile / portable media player with which they could "subscribe" to published lecturecasts. Almost half (44.9%) preferred to view "PC version" (compact disc media) lecturecasts rather than web-based versions. Studies like these highlight the importance of analyzing actual student use of provided lecturecasts. Cann (2007) and Deal (2007) in both quantitative and qualitative studies found lecturecasts are generally not popular with students and do not significantly affect learning outcomes. While these negative research results are not universal, as Barret et al. (2006) reported in the context of students learning about heart functions, the present research literature contains more studies about the impact of instructor-created podcast content than student-created content. These findings led the present researcher to avoid a study on lecturecasting systems or methods, and instead focus on student-created podcasting / phonecasting options which support a pedagogical approach of active learning.

In the present study, a summary of questionnaire data collected by the instructor utilizing student summary lecture phonecasts during Spring 2009 at USM is provided as Appendix B. While a positive impact for podcast / phonecast authors is predicted by constructivist learning theory, the value of those podcasts for other students relies on secondary media consumption. To have value for other students those podcasts must be consumed (watched or listened to) by other students who did not create the recordings. This area of student-created podcast utilization by

peers needs more research, particularly with classes including students equipped with mobile media players capable of podcast / lecturecast subscription and provided with instruction / support in the procedures to subscribe to lecturecasts.

Student Created Podcasts

In contrast to instructor-created or instructor-recorded lecturecasts, student created podcasts have been utilized by a more limited number of instructors in universities in the United States, Italy, and Australia. Academic studies about student-created podcasts in colleges and universities are therefore (predictably) less common in current research literature.

Lee and Chan (2007) studied the impact of short, 3 to 5 minute recorded audio podcasts by students about course material at Charles Stuart University in Wagga Wagga, Australia. Their end-of-course survey instrument results concluded student podcasts offered outstanding potential to help students learning at a distance from the university to acculturate and better integrate into the academic life of the institution despite physical separation from other students. Their study did not, however, report on the impact these student-created podcasts had on achievement or learning outcomes. Student-created podcasts in their study were focused on course topics, but were not lecture summaries like those of the present study.

Lazzari (2008) conducted a study of students involved in podcast production during a course on multimedia communication and human-computer interaction in Italy. The impact of student created podcasts on student performance, measured by

final course grades, was evaluated by comparing exam grades over three academic years. Although student participation in podcasting activities was found to positively influence students' performance, promote cognitive elaboration, and enhance critical thinking, this impact was not found to be statistically significant.

Frydenberg (2008) shared audio lecturecasts in an introductory technology course and assigned student summary video podcasts (vodcasts) during the second half of the term. Students worked with a partner to create six to 10 minute video summaries of instructor lectures. Frydenberg's study found positive student attitudes about the use of podcasting to support learning, but he did not analyze the impact of student-created podcasts on grades or other measures of student achievement.

The summary lecture vodcasting intervention activities studied by Frydenberg closely resembles the student summary lecture phonecasting activities in the instructor's HEALTH101 class at USM in Spring 2009 with several important differences. In Frydenberg's class and study, students used webcams and computers to create video podcasts instead of a phone to create audio podcasts (phonecasts.) These required steps were comparatively more complex and time consuming than phonecasting. Frydenberg reported students were required to demonstrate a complex understanding of how to combine audio and video, compress produced files, post files to a web server, and update the web feed with information from each new episode. Because of the large number and complexity of these procedures, Frydenberg's vodcasting project did not support "the ethic of minimal clicks" (Fryer, 2011, p. 51).

In contrast to these steps and procedures, students in the USM instructor's HEALTH101 course were only required to make a phone call, enter a channel password, and record their lecture summary to create their phonecasts. Another difference between the present study and Frydenberg's is the researcher's focus on student achievement.

Phonecasting

Phonecasting provides a simplified process for creating audio-only podcasts using a land-line or cellular telephone. While podcasting has grown in use since the mid 2000s, phonecasting has become available via commercial websites more recently. Comparatively speaking, much less academic research has been completed to date on the use of phonecasting to support learning in K-12 as well as university educational settings. No conspicuous literature is available presently analyzing the impact of student-created lecture summary phonecasts on student achievement in a college course.

Schettini et al. (2010) documented the use of phonecasting in a U.S. elementary school by students to improve their writing skills. Phonecasting was utilized as part of the writing process, to make the "read aloud" phase more permanent and digitally archived for later review by the student, teacher, or parent(s). While this study demonstrated the potential value of phonecasting in a K-12 classroom, it did not attempt to analyze the impact of phonecasting on student achievement.

Wood (2010) reported on the use of phonecasting as well as other web-based, interactive technologies to "increase participation, motivate, and engage nurses and others in ways that would not have been possible previously." In the study, nursing students utilized land-line phones as well as cellular phones to create and listen to phonecasts created by peers. Student achievement was not analyzed as part of this study including phonecasting, however.

Freshman Attrition Rates and Student Grades

Many factors influence the academic grades earned by first year undergraduate students in college. Researchers have documented high levels of student attrition during and following the first year of college (Jones & Braxton, 2009). The existence of these high attrition levels and the potential causes for these dropout rates are relevant to the current study. These research results can highlight the need for new pedagogic interventions as well as the types of instructional changes which can specifically improve student achievement for freshman undergraduate students.

Niu and Tienda's 2009 study of first year student drop out rates in five major Texas universities revealed the high attrition rates representative of many colleges across the United States. In the study, researchers defined freshman year attrition as including "students who do not enroll for one or more semesters following fall matriculation." Niu and Tienda reported freshman year attrition rates of 11% for UT-Austin (1990-2003), 9% for Texas A&M (1992-2002), 13% for Texas Tech (1991-2003), 34% for UT-San Antonio (1990-2003), and 11% for SMU (1998-2004).

Interaction with faculty (along with university staff and peers) is one of several variables identified as influencing undergraduate "student success" in some academic models for freshman attrition and retention. "Success" in this context can be defined more broadly than just graduating from a university. Since data including student grades and persistence/attrition is most readily accessible at multiple institutions, however, many studies focus primarily on these factors (Kuh et al. 2008, p. 541). Some studies "linking student engagement in educationally purposeful activities" to student achievement as well as persistence define student engagement as a composite of student time spent studying, in co-curricular activities, as well as other factors (Kuh et al. 2008, p. 544). Student engagement in the study of Kuh et al. was not defined as the use of active rather than passive pedagogical practices by faculty, or the specific use of active instructional strategies like summary lecture phonecasting.

Faculty instructional practices and interactions with students can be important influences for students deciding to quit college. A recent study of Australian universities found teacher-related reasons were the “main trigger” for student departures from college by the third year of study, and recommended faculty and staff take extra steps to meet individual student needs as well as “manage competing demands” on their time (Willcoxson et al. 2011).

Statistical analyses of student grades in high school and college entrance examination scores provide an incomplete basis for understanding why students drop out of college for academic reasons (Arendale, 1994). Research on effective institutional strategies to retain college students and improve graduation rates

highlights the importance of "shared, connected learning environments (Tinto, 2002). Supportive and cohesive peer learning groups are strongly correlated with improved academic performance in college. Strategies employed by institutions as well as individual course instructors to promote peer learning can positively influence student learning, retention, and graduation rates.

Summary

Constructivist learning theory supports the active creation of knowledge products by learners to develop and demonstrate their mastery of assigned subject material. A variety of different technology resources and learning strategies can be employed to support active learning, but the mere presence of technology in a classroom or instructional setting does not guarantee positive outcomes. While a relatively large number of studies have been completed to date on the effects and utility of instructor-created lecturecasts, relatively few studies focus on student-created podcasts. Even fewer studies have been undertaken focusing on phonecasting and specifically the creation of phonecasts by students to summarize instructor-provided lecture material. First year student attrition rates are high in many colleges and universities, and past studies highlight the importance of faculty interaction on student retention. More research is needed to explore the potential benefits of student-created phonecasts, and specifically the impact these instructional activities can have on student learning outcomes.

Chapter 3: Methodology

Purpose

This study seeks to determine whether academic achievement differs between students taught in an introductory, undergraduate health course requiring the creation of lecture summary phonecasts by students, and students taught in an introductory, undergraduate health course which does not require phonecast creation.

The primary variable of interest in the study is student academic achievement, measured as final course letter grades. Since the treatment was implemented before research preparation started, it was not possible to randomly assign students to treatment and control groups. For this reason, the researcher utilized an ex post facto study including a covariate to account for pre-existing differences in student academic achievement (Cook & Campell, 1979, p. 98). Students' composite ACT score upon entering college will be used as the study's covariate.

Setting

The course designation and university abbreviation in this study are pseudonyms for an actual course and university in the midwestern United States in which this pilot project was implemented using student lecture summary phonecasting. In Spring 2009, the university had a total headcount of 14,510 students, with 12,985 classified as undergraduates and 1525 as graduate students. The combined Full-Time Equivalent (FTE) for students in spring 2009 was 10,908. The College of Education and Professional Studies, which offers the course analyzed

in this study, reported a headcount of 3,997 students. 3001 of these were undergraduates, 996 were graduate students, and their combined FTE was 2957.

The university enrolled 5885 men and 8625 women in the spring 2009 term. In terms of ethnicity, 60% of enrolled students were Caucasian, 9% African-American, 5% American Indian, 3% Asian, and 4% Hispanic. 6% were international students without resident status, and 13% did not declare an ethnicity. 61.2% of enrolled students were from the larger metropolitan area in which the university is situated, and 78.8% of enrolled undergraduate and graduate students were classified as in-state students (UCM Enrollment Statistics and Demographics Book).

Research Participants

The participant sample for this study included students enrolled in sections of HEALTH101 at UCM taught by the same instructor in Spring 2008, Fall 2008 and Spring 2009. Spring 2009 was the term in which the instructor used lecture summary phonecasting as a required assignment. Archived data was used for this study, so no recruitment methods were utilized.

Publicly reported data aggregated by MyEdu.com (formerly PickAProf.com) reveals the average grade for students in HEALTH101 varies widely by instructor. Of the twenty instructors teaching HEALTH101 in fall 2010, the grade average of students in past semesters aggregated by instructor varied from a low of 1.65 to a high of 3.1, on a 4.0 grading scale. Table 1 highlights these differences. ("Professor Ratings," 2010).

Table 1

Average GPA History of Fall 2008 HEALTH101 Instructors at USM

Instructor	Average Student GPA
1	1.65
2	1.95
3	2.06
4	2.09
5	2.10
6	2.20
7	2.26
8	2.35
9	2.61
10	2.70
11	3.00
12	3.05
13	3.10
14	not reported
15	not reported
16	not reported
17	not reported
18	not reported
19	not reported
20	not reported

The wide variation in average student GPA scores for HEALTH101 instructors not only highlights a problem addressed by this study, but also reveals the value of studying students taught by a single instructor in this course.

Of the 103 students enrolled in the instructor's sections in Spring 2009, only 100 of those students have entering ACT scores on file with the university. In Spring 2008, 154 students were enrolled in the instructor's sections, with entering ACT scores available for 147. In Fall 2008, 119 students were enrolled and 110 of those had available ACT scores. The proposed research sample for this comparative study had 100 students in the treatment group, 110 students in the first control group,

and 147 students in the second control group. Gender information and other identifying information about students was not available in the archived data available to the researcher. Table 2 summarizes information about the functions of student groups by term, student group designations within this study, and the number of study participants in respective academic terms / student study groups.

Table 2

Treatment and Control Groups

Term	Function	Study Designation	N
Spring 2009	Treatment	Treatment	100
Fall 2008	Control	Control 1	110
Spring 2008	Control	Control 2	147

All undergraduate students at UCM are required to take HEALTH101 during the fall or spring semesters of their first year. HEALTH101 is a weekly, two credit hour course which meets face-to-face on campus. For the most part, content of the course, assessment procedures, and weekly assignments are consistent across all course sections. In this course, students study and learn about topics including wellness, fitness, "lifestyle management," stress, cardiovascular health, cancer, muscular strength/endurance, flexibility, body composition, nutrition, weight management, and sexually transmitted infections. This standardized curriculum is mandated by the Department of Kinesiology and Health Studies, which oversees the HEALTH101 course, to insure all students receive the same course content. Minor variation is permitted in course procedures and assignments by instructors, which include adjunct as well as full-time university professors. A sample syllabus used by the instructor in Spring 2009 is included as Appendix A. The topical schedule

included in the syllabus is, with minor exceptions, identical to the standard syllabus used by all course instructors of HEALTH101 at USM.

General Design

This ex post facto quantitative study utilized a quasi-experimental, posttest-only with nonequivalent groups research design (Cook & Campell, 1979). The independent variable was defined as the course section. This variable has two categories, those receiving the special instruction and those not receiving it. The dependent variable was defined as final grades earned by students in HEALTH101. This ordinal variable has a range five values: A, B, C, D, and F. These grades were converted to grade points of 4, 3, 2, 1, and 0, respectively. The initial covariate was students' entering ACT composite scores. This variable was used to statistically control preexisting academic differences. Students' entering ACT math scores were used as a covariate in a subsequent statistical analysis.

Since this was an ex post facto analysis, it was not be possible to randomly assign students to specific course sections. Students self-select course sections of HEALTH101 taught by specific instructors. Students could select their section based on the instructor they wanted, the days of the week the class met, or other factors. To partially control for instructor differences and variability, only students taught by the same instructor were included in this study. The three sections of HEALTH101 taught by the instructor in Spring 2009 met on Mondays and Wednesdays at 1 pm, Tuesdays and Thursdays at 12 pm, and Tuesdays and

Thursdays at 1 pm in Spring 2009. Having only one instructor in the study is a bias which limits the study, however. The instructor could be biased in favor of or be opposed to the new teaching technique. As a result, the instructor could do a better or worse job of teaching selected classes and thereby influence student performance in the course.

The researcher conducted preliminary analyses of the data in this study to investigate the relationship between the dependent variable (student grades) and the covariates (composite ACT scores and math ACT scores.) These analyses were needed to meet the required assumption of ANCOVA (Analysis of Covariance) that the relationship between these variables is linear (Hinkle, Wiersma, and Jurs, 2003, p. 497). In addition, the researcher tested for the homogeneity-of-regression assumption using a procedure in which the sum of squares within each group is adjusted using the correlation coefficient between the dependent variable and covariate. This test was utilized to verify the regression lines for the individual groups are parallel, implying there is not covariate-treatment interactions. This second analysis procedure was required to meet the homogeneity-of-regression assumption of ANCOVA (Hinkle et al., 2003).

Results from an instructor-administered end-of-course survey for students enrolled in sections receiving the treatment in the study were also analyzed. These results, submitted by a majority of students enrolled in course sections receiving the summary lecture phonecasting assignment, highlighted student perceptions about phonecasting, utilization of peer-created phonecasts, use of mobile devices to listen to phonecasts, and other behaviors. The instructor solicited student comments in

the survey, including suggestions to improve similar phonecasting projects in the future.

The researcher conducted an oral interview with the instructor to obtain additional background information about the phonecasting project and its implementation in spring 2009. In addition to obtaining information about the instructor's background, prior use of technology in the classroom and the Health101 course, the researcher asked questions about assistance the instructor received in implementing the phonecasting project and changes the instructor made to the course syllabus because of this assignment. The researcher asked questions about the instructor's perceptions of results from the project including feedback from students, impressions about the project's effects, and recommendations for improving similar phonecasting projects in the future.

Control Group

Two student groups (N=110 and N=147) served as the primary control groups in this study. Only students completing the HEALTH101 course, receiving a final grade from the same instructor, for whom entering ACT scores are available were included in the study sample. The researcher treated these control groups separately in the study's statistical analyses, as well as a single group (N = 257) to determine if statistical significance depended on the size of the control group. This design decision may highlight patterns or differences attributable to unique factors in the course or in delivered instruction during those respective terms.

The size of the combined control groups (N = 257) is larger than those in the treatment (N = 100). The instructor taught four sections of HEALTH101 in the fall 2008 and three sections of the course in spring 2008. She taught only three sections in spring 2009 when student lecture summary phonecasting was utilized as a required assignment. During the academic terms preceding spring 2009, when phonecasting was not utilized, the instructor taught HEALTH101 without notable customizations or changes from the standard course syllabus (Course instructor, Personal Interview, October 19, 2011). Students completed weekly assignments as well as course exams in class, and were not required to utilize any special technologies or communications platforms to complete the course.

Treatment

In the Spring of 2009, an adjunct instructor utilized phonecasting in required student assignments in three sections of HEALTH101. The instructor required students in each of her sections, on a rotational basis, to create a "summary phonecast" of one of her lectures during the semester following a detailed rubric included as Appendix D. At the start of term, the instructor assigned a meeting date to each student. Students were required to complete the phonecasting activity as a required assignment for their assigned date. The instructions provided by the instructor to her students for the phonecasting assignment are also included in Appendix D.

Since the number of students in each section exceeded the number of meeting dates, some students were assigned to create phonecasts on the same day. According to provided instructions, each recorded phonecast:

1. Must be 10 minutes in length or LESS.
2. Must be recorded the same day as the class lecture, NO LATER THAN 11:30 pm.
3. Will be recorded using your PHONE and the phone number, channel code, and password indicated below.
4. Will count as an assignment during the semester.

In addition to recording their own summary phonecast, each student was required to listen to and comment on at least five of their classmates' phonecasts. This requirement was created by the instructor to encourage as well as document students listening to each other's phonecasts. Commenting was available on class blogs set up on Wordpress.com. After each phonecast was recorded, the phonecasting system was configured to immediately cross-post the linked phonecast on the class blog. By following this procedure, students avoided the need to manually upload a recorded podcast to a web server and update an RSS / web feed for the class podcast, as required of students in Frydenberg's previously referenced 2008 study.

At the end of the semester, students completed a short, instructor-created survey about their completion of the phonecasting assignment at the request of the instructor. The summarized results of this survey are included as Appendix C.

Data Collection

Data for this study was requested from the Institutional Research Office of USM. The researcher requested de-identified student data for the sections of HEALTH101 taught by the instructor in spring 2008, fall 2008, and spring 2009. Requested student data for these course sections included students' final grade as well as entering ACT scores. For most students, in addition to a composite score, data included ACT English, Math, Reading, and Science scores.

The dependent variable, student academic achievement reflected in the final course letter grade, was measured in HEALTH101 primarily by a series of standardized tests taken by all students, in all sections of the course. Appendix A, the course syllabus for the instructor of course sections included in this study, lists the four examinations as:

1. Exam #1- Chapters 1,10,11,12
2. Exam #2- Chapters 2,3,4,5,6
3. Exam #3- Chapters 8,9,13,14
4. Comprehensive Final Exam

Quizzes and other graded assignments, including the required phonecasting assignment, comprised the rest of the final grade assigned to students. Individual instructors were provided some latitude to modify these additional assignments. The phonecasting activity was the only course assignment which explicitly encouraged higher order thinking skills about course content.

Data Analysis

An analysis of covariance (ANCOVA) was performed on student final grades to determine if a statistically significant difference existed between the treatment and control group in the study. Statistical data was analyzed using SPSS for Windows Version 19. Descriptive data including frequencies, means, standard deviations, variances, and sample sizes was generated to describe the specific study groups. Statistical data was tested for two-tailed significance at a .05 alpha level.

Chapter 4: Analysis of Data

Introduction

The goal of this study was to test the following hypothesis (H_0): There is no significant difference in final grades, as ordinal (letter grade) variables, between students taught in a classroom utilizing student summary lecture phonecasting and students taught in a traditional classroom setting. Available study sample demographics are described, and findings for the hypothesis are reported. Additional findings are also reported using an alternate statistical comparison.

Description of Participants

A limited amount of demographic information is available about study participants based on data provided by the university to the researcher. A total of 357 student cases were included in the study. These students were enrolled in the study instructor's course sections of Health 101 in spring 2008, fall 2008, and spring 2009. Male and female students were enrolled in each course section each term, but the breakdown of male versus female students in each section is not available.

Spring 2008 and fall 2008 sections were defined as "traditional classroom settings" in which student summary lecture phonecasting was not used as a required course activity by the instructor. Students in the Spring 2009 term comprised the experimental group of the study. The researcher excluded student cases in each semester which did not include complete statistics required for the analysis of this study. These case statistics included a final letter grade in the Health

101 course, an entering composite ACT score, and individual ACT scores for English, reading, math, and science. Table 3 indicates the breakdown of student cases used in the study, after cases were excluded due to incomplete student data.

Table 3

Final Treatment and Control Groups

Term	Function	Study Designation	N (initial)	N (final)	Cases Excluded
Spring 2009	Treatment	Treatment	103	100	3
Fall 2008	Control	Control 1	119	110	9
Spring 2008	Control	Control 2	154	147	7

Each control group (semesters without summary lecture phonecasting) was compared separately with the treatment group in the study. In addition, statistics from both control groups were combined to analyze differences with the treatment group. For statistical analysis, student final grades were coded as follows: A = 4, B = 3, C = 2, D = 1, F = 0. Table 4 includes descriptive statistics for all three semesters, with both control groups combined into group 2.

Table 4

Descriptive Statistics

	Mean	Std. Deviation	N
Group 1 (treatment)	2.51	1.291	100
Group 2 (control)	2.29	1.350	257
Total	2.35	1.336	357

The mean grade for students in Spring 2009 (the treatment group) was higher than the mean grade for students in the aggregate control group. To

determine whether or not this higher average grade represented a statistically significant difference, however, more sophisticated data analysis was required.

Analysis of Hypothesis

To prepare study data for analysis using SPSS software, the researcher added an additional field to the data set coded to reflect the student group. Student data from Spring 2009 (the treatment group) was coded as group zero, while student data from Spring 2008 and Fall 2008 (the control groups) was coded as group one.

To confirm the assumptions for ANCOVA were met for this data set, the researcher completed three homogeneity-of-regression tests as well as analyses investigating the relationship between the dependent variable (student grades) and the covariate (student composite ACT scores). Results from these tests are included as Appendix E.

To provide a baseline of statistical results for later comparison, the researcher conducted an Analysis of Variance (ANOVA) procedure without a covariate. Table 5 includes results of this General Linear Model test, which yielded a significance of 0.159. Since this finding is not less than 0.05, the difference in student grades between these groups is not statistically significant.

Table 5

ANOVA: General Linear Model Without Covariate

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.550[a]	1	3.550	1.995	0.159
Intercept	1657.197	1	1657.197	931.330	0.000
Treatment	3.550	1	32.550	1.995	**0.159**
Error	631.683	355	1.779		
Total	2607.000	357			
Corrected Total	635.232	356			

[a.] R Squared = .037 (Adjusted R Squared = 0.031)

To determine if the increased mean of final student grades in the Spring 2009 term constituted a significant difference, the researcher conducted an Analysis of Covariance (ANCOVA) test. The first ANCOVA test compared all three semesters of student data for Health101, aggregating both control terms (spring 2008 and fall 2008) into a single group. Table 7 includes results of this ANCOVA test, which yielded a group significance of 0.173. This finding is not less than 0.05, so this initial ANCOVA test indicates the difference in student final grades between these groups is not statistically significant using composite ACT scores as a covariate.

Table 6

ANCOVA Test (2 Control Semesters Combined, ACT Composite as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23.282[a]	2	11.641	6.734	0.001
Intercept	7.696	1	7.696	4.452	0.036
ACT Composite	19.732	1	19.732	11.415	0.001
Group	3.228	1	3.228	1.867	**0.173**
Error	611.950	354	1.729		
Total	2607.000	357			
Corrected Total	635.232	356			

[a.] R Squared = .037 (Adjusted R Squared = 0.031)

This ANCOVA test group significance of 0.173 is higher than the ANOVA test significance of 0.159 shown in Table 5.

To explore potential differences between results in different comparison terms, the researcher conducted two further ANCOVA tests. The second ANCOVA test compared student final grades in the spring 2008 control term with student grades in the spring 2009 treatment term. Table 7 includes results of this ANCOVA test, which yielded a group significance of 0.267. This finding is not less than 0.05, so this second ANCOVA test indicates the difference in student final grades between these groups is also not statistically significant using composite ACT scores as a covariate.

Table 7

ANCOVA Test (Spring 2008 to Spring 2009, ACT Composite as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	9.340[a]	2	4.670	2.749	0.066
Intercept	6.666	1	6.666	3.924	0.049
ACT Composite	7.591	1	7.591	4.469	0.036
Group	2.107	1	2.107	1.241	**0.267**
Error	351.617	207	1.699		
Total	1585.000	210			
Corrected Total	360.957	209			

[a.] R Squared = .026 (Adjusted R Squared = 0.016)

The third ANCOVA test compared student final grades in the fall 2008 control term with student grades in the spring 2009 treatment term. Table 8 includes results of this ANCOVA test, which yielded a group significance of 0.218. This finding is not less than 0.05, so this third ANCOVA test indicates the difference in student final grades between these groups is also not statistically significant either using composite ACT scores as a covariate.

Table 8

ANCOVA Test (Fall 2008 to Spring 2009, ACT Composite as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22.169[a]	2	11.085	6.459	0.002
Intercept	2.376	1	2.376	1.384	0.241
ACT Composite	18.405	1	18.405	10.724	0.001
Group	2.623	1	2.623	1.529	**0.218**
Error	418.762	244	1.716		
Total	1817.000	247			
Corrected Total	440.931	246			

[a.] R Squared = .050 (Adjusted R Squared = 0.042)

Additional Statistical Findings

Since these three ANCOVA tests yielded a significance level close to 0.05 but greater using student composite ACT scores as a covariate, the researcher wondered if another available statistic could alternatively be used as a covariate and "explain" or account for more of the variation in student final grades. Each student data case in this study not only included a composite ACT score, but also separate ACT scores in English, reading, math, and science. Other researchers have found student ACT math scores are the most reliable and powerful predictor of student persistence in undergraduate university studies among separate English, reading, math and science ACT scores (Tippin, 2006). Tippin found the highest level of math taken by a student in high school has a statistically significant correlation to the level of pre-college student development. Based on this finding, it is reasonable to posit ACT math scores should correlate strongly with student academic achievement in college and could serve as a more useful covariate in the present study instead of the composite ACT score.

With these past research findings in mind, the researcher conducted three additional ANCOVA tests using available student data. The format for these ANCOVA tests followed the previously described tests, except student ACT math scores were used as the covariate rather than composite ACT scores.

Before conducting an analysis of covariance, as explained earlier, two preliminary analyses of the data were again conducted to ensure the assumptions of ANCOVA were met. These are detailed in Appendix E.

After meeting both assumptions for ANCOVA in these preliminary analyses, the researcher conducted an ANCOVA test comparing all three semesters of student data for Health101 with ACT Math scores as the covariate. As previously described using ACT Composite scores as the covariate, this ANCOVA procedure aggregated both control terms (spring 2008 and fall 2008) into a single group (N = 257) and analyzed this combined group with the treatment term (Spring 2009, N = 100). Table 9 summarizes results of this ANCOVA test which yielded a group significance of 0.104. This finding is extremely close to an alpha level of 0.1, which supports prior research and analysis suggesting ACT Math scores can serve as a better covariate in the present study than ACT Composite scores. In contrast, as reported previously in Table 6, the group significance for ANCOVA with both control semesters of data combined using ACT Composite scores as a covariate was 0.173. This new ANCOVA result using ACT Math scores as a covariate, 0.104, was smaller but still was not less than 0.1 or 0.5. For this reason, this additional ANCOVA test indicates the difference in student final grades between these groups is not statistically significant using composite ACT Math scores as a covariate.

Table 9

ANCOVA Test (All 3 Semesters, ACT Math as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	26.776[a]	2	13.388	7.789	.000
Intercept	13.269	1	13.269	7.720	.006
ACT Math	23.226	1	23.226	13.513	.000
Treatment	4.579	1	4.579	2.664	**.104**
Error	608.457	354	1.719		
Total	2607.000	357			
Corrected Total	635.232	356			

[a.] R Squared = .037 (Adjusted R Squared = 0.031)

The value and importance of conducting an ANCOVA instead of a more simplistic data analysis procedure is highlighted by the correlations results with the dependent variable (Gradepoint) and various ACT scores (Composite, English, Math, Reading, and Science/Reasoning) which could potentially be used as covariates in this study. Table 10 summarizes these results. (N = 357)

Table 10

Correlations Among Variables (All 3 Semesters)

ACT Score	Statistic	Gradepoint
ACT Composite	Pearson Correlation	.178
	Sig. (2-tailed)	.001
ACT English	Pearson Correlation	.227
	Sig. (2-tailed)	.000
ACT Math	Pearson Correlation	.187
	Sig. (2-tailed)	.000
ACT Reading	Pearson Correlation	.131
	Sig. (2-tailed)	.013
ACT Science / Reasoning	Pearson Correlation	.139
	Sig. (2-tailed)	.008

Although the Pearson Correlation for ACT English and student Gradepoint scores is the highest among the five available scores, additional data analysis by the researcher revealed an ANCOVA analysis using ACT English as a covariate resulted in a significance finding greater than either the previously described ANCOVA procedures using ACT Composite scores and ACT Math scores as covariates. As supported by prior research, the ACT Math score served as the best covariate for the study explaining the most differences in students' pre-existing academic differences among the available ACT scores. While the ANCOVA analysis using ACT Math scores

as a covariate (comparing student final grades in Health101 with the treatment condition of instructor mandated summary phonecasting assignments) was very close but not below the theshold of 0.1 for significant differences, the result does point to important interactions among the studied variables. While ACT math scores are more significantly correlated to the dependent variable in this case, it is important to note the covariates in the study do not account for large amounts of variation in prior academic achievement of students overall.

The practical significance of the interactions among studied variables is highlighted further through an analysis of effect size. Effect size can provide a measure of practical significance of differences between studied groups independent of sample sizes. In the present study, calculations yielded an effect size (Cohen's *d*) of 0.167. Using Cohen's classifications, this effect size is interpreted as small but positive (Cohen, 1965). Since statistical significance can be found for groups with small differences in means if samples sizes and effect sizes are large enough, effect size is important to consider when evaluating the practical implications of study results. The impact of this effect size finding is discussed further in Chapter 5.

Research Question Results

The primary research question in this study was whether the use of student summary lecture phonecasting relates to student academic achievement, controlling for the effects of prior academic differences. While the statistical analyses conducted in this study failed to reject the null hypothesis (there are no differences in student

grades among studied groups) with a finding of statistical significance less than 0.1 or 0.05, results using student ACT math scores as a covariate were very close to statistical significance. When combined with an analysis of the small effect size of the study's groups, discussed in more detail in Chapter 5, the researcher finds a noteworthy relationship between summary lecture phonecasting and student achievement. From the perspective of significance testing and quantitative analysis, this relationship cannot be formally defined as "significant." As subsequent analysis details, however, a relationship between these variables is evident and warrants further study as well as investigation by other college instructors.

Instructor Survey and Instructor Interview Results

At the conclusion of the spring 2009 term, in which the instructor used summary lecture phonecasting with students, the instructor administered a short, anonymous survey of students. Summarized results from that survey are included as Appendix C. In addition to obtaining the results of the end-of-course instructor phonecasting survey, the researcher conducted a phone interview with the instructor to learn how the phonecasting project was implemented and supported. Several noteworthy findings resulted from that interview which are detailed below (Course instructor, personal communication, October 19, 2011). The researcher combined these survey results with information from the instructor interview. These are summarized under six general headings:

1. Few Students Regularly Used Peer Created Phonecasts
2. Students Were Neutral About Benefits of Phonecasting

3. Phonecasts Were Challenging to Access
4. Instructor Feedback and Oversight of Phonecasts Needed
5. Outside Assistance Critical for Phonecast Configuration
6. Suggestions for Project Improvement

Few Students Regularly Used Peer Created Phonecasts

Of the 102 students who completed all questions in the instructor survey, 88 students or 86% of respondents reported listening to at least one of the recorded lecture summaries (phonecasts) created by their classmates during the term. This is reflected in question two of the instructor survey. Since data provided by the university for this study did not include elements which reflected individual student levels of participation in the phonecasting assignment, this informal survey result is helpful. This result indicates a large majority (more than 75%) of students participated in the phonecasting assignment at least as listeners at least once.

The eighth multiple choice question of the instructor survey addressed the frequency with which students listened to classmate phonecasts during the term. 80 of 102 students, or 78%, reported listening "only a few times" to classmate phonecasts. While a majority of students listened to at least one peer-created phoncast during the term, survey results indicate students did not frequently and consistently listen to peer phonecasts.

Students Were Neutral About Benefits of Phonecasting

Some student responses to the open-ended feedback section of the student survey were positive about the value of phonecasting. One student wrote, "It [the

phonecast] was very helpful for us to get to know all the summary of the class which was taught in a day." Another reflected, "It [the phonecast] made us research a certain topic more in depth and helped in case we missed a class." Four others identified the benefit of being able to access the phonecast lecture summaries on days they missed class.

Although some students positively highlighted the benefits of phonecasting in the survey, results from multiple choice questions reflected generally neutral student perceptions of the project. In response to question three of the instructor survey, 73 of 102 respondents (72%) indicated the phonecasts were not helpful or were neutral in helping them understand course material better or perform better on tests. 7 students responded the phonecasts were "very helpful" for their understanding of course material and test performance, and 22 others responded to this question with a "4" on the Lickert scale. Only 29 students or 28% of repondents, about one-fouth of the students in the Spring 2009 term who participated in summary lecture phonecasting activities, reported positive perceptions of phonecasting for their learning.

Question four of the instructor survey addressed perceived student benefits from the phonecast creation process. 48 of 102 students or 47% (almost half) reported the phonecast creation process was very helpful or helpful in their learning of course material. Question five of the instructor survey asked students if they perceived the summary phonecasting activities as worthwhile and if they should be repeated for students in succeeding semesters. 37 of 102 students (36%) responded

affirmatively that the phonecasting activities were worthwhile and should be repeated.

None of the student responses to these questions were overwhelmingly positive. Of the five student survey comments categorized as "negative" in the concluding "open feedback" portion of the survey, three reported not completing the assignment because it was of little interest, the student forgot about it, and it was confusing. While more students perceived the phonecasting creation process to be beneficial than the process of listening to phonecasts created by their classmates, generally student perceptions of the phonecasting project were neutral.

Phonecasts Were Challenging to Access

Access issues with the "tools for phonecasting" were not a significant problem for students participating in the phonecast creation phase of this project. The instructor estimated at least 90% of her students in past semesters have had their own cell phones. Technology access issues were a problem in the college's computer labs, however. In the survey feedback a student noted, "…the lack of audio capabilities on campus computers placed undue burden on students." Computers provided for student use in labs in the college do not have attached speakers or audio headphones, and students in the college are not required or expected to possess or bring their own laptops or headphones / earbuds to class.

Students in the Health101 course sections of the instructor participating in summary lecture phonecasting activities were told they could "subscribe" to class phonecasts using iTunes or other free "podcatching" software, but were not

provided with assistance during or outside of class with this subscription process (Course instructor, personal communication, October 19, 2011). Questions six and seven of the instructor survey highlighted the relatively low utilization levels of podcatching software programs by students in the phonecasting sections and infrequent use of mobile devices to listen to phonecasts. Responses to question six revealed only 8 of 102 students (8%) reported using iTunes or another podcatching program to subscribe to their class' phonecast channel. These channels (and "subscribable" RSS feeds) were automatically generated by the phonecasting service utilized by the instructor. Question seven of the instructor survey revealed only 7 of 102 student respondents (7%) reported listening to classmate phonecasts on a mobile device like a smartphone or portable mp3 player.

Access issues for students to web-posted phonecasts were also challenging because third-party websites were used which were not well integrated into the university's learning management system (WebCT). One student commented in the survey, "The website needs a different layout. It was hard to find the different days." The instructor also echoed this feedback in the interview, expressing frustration at the lack of integration for supplementary textbook websites into the course learning management system. She predicted student utilization of classmate phonecasts would have been greater if the phonecast websites had been directly integrated into the learning management system students were already using for their online course content and assignments.

Instructor Feedback and Oversight of Phonecasts Needed

Two students providing "constructive" comments at the conclusion of the end-of-course survey highlighted the need to improve the quality of student phonecasts. One wrote, "I think it was a good idea but people recording needed to put more time into it. Some were great and some were so-so." Another student commented, "I think that most students assigned to this just went on the website and looked for the shortest summaries, and made a short comment not really relating to the material." This latter comment referenced the course requirement for students to listen and leave comments on several phonecasts made by classmates. While the instructor verified students completed their assigned lecture summary phonecast, the instructor did not utilize a procedure for checking if students completed the "commenting part" of their assignment. As a result, many students did not comment on classmate phonecasts or left very short comments of limited value to the phonecast author.

Outside Assistance Critical for Phonecast Configuration

Prior to the spring 2009 term, the instructor had not utilized cell phones in any capacity for assignments in her university classes. In the interview she reported a high level of satisfaction with the support she was provided by an outside educational technology expert during the spring 2009 semester when she utilized phonecasting as a required assignment. The outside assistant helped her setup the phonecasting procedures and handouts for students with instructions about the process. The assistant setup separate blogs for her three sections on

Wordpress.com, configured a free phoncasting service (Gabcast.com) to cross-post student recorded phonecasts to each class blog, and also came to each class at the start of term to explain the process as well as answer questions. The instructor reported this outside assistance was essential for the success of the project, which "made it very seamless" for her as well as for students.

Suggestions for Project Improvement

Students provided several suggestions for improving phonecasting projects in the future. One student suggested text-based summaries instead of audio summaries of lectures could be used, writing "Maybe a similar system with text that can be printed would be useful." Other students suggested the instructor could check more frequently on the quality of the student-created phonecasts and encourage students to leave more thoughtful, helpful comments for peers.

In response to a question about ways she thought projects like this could be improved in the future, the instructor reported she would like to give students some choices about the lecture topics they summarize with a phonecast rather than randomly assigning them as she did in spring 2009. She felt the quality of student phonecasts might improve if students had a greater interest in the topics of the lecture that week. She also reflected it would be beneficial for her to record and share the first lecture summary phonecast of the term with students and discuss it with them. In spring 2009 she tested the phonecasting service and procedures to verify they worked, but did not record and share a full lecture summary phonecast. She reported some students did not do the assignment, but that is normal for some

students with other assignments in the course. She reported high satisfaction with the technology support she received for the phonecasting project, but felt tighter integration with the course learning management system (WebCT) would have made the phonecasts easier for students to utilize during the semester. She also suggested students could record a video clip of their lecture summary with a smartphone and share those with classmates, as an option. The instructor reported she was a very visual learner and knew many of her students are as well, so these visual summaries might be better utilized by students than audio-only phonecasts. The instructor reported she has not utilized phonecasting again in her courses since the spring 2009 term, but definitely would utilize them if technology assistance for these activities was offered and available.

Summary

Differences in student final grades in Health101 between the treatment term, in which summary lecture phonecasting was used as a classroom activity, were not significantly different from control terms when analyzed in aggregate or as separate terms when composite ACT scores were used as a covariate in an Analysis of Covariance test. When student math ACT scores were used as a covariate in the same ANCOVA procedures, results were still not statistically significant but were very close to significant at the 0.1 level.

Results from an end-of-course instructor survey of students as well as an interview with the instructor highlighted several results and classroom dynamics not included in the study's statistical results. A large majority of students in the

treatment semester reported listening to some peer-created phonecasts, and almost half the students reported the process of creating lecture summary phonecasts helped with their learning in the course. A little more than a third of instructor survey respondents indicated the phonecasting project was beneficial and should be repeated. In an interview with the instructor, she highlighted the value and importance of outside technical support to streamline phonecasting procedures for students. She also reported a positive experience with the phonecasting assignments for her students, and provided suggestions for improving future phonecasting activities in other classes which are explored further in Chapter 5.

Chapter 5: Summary of Findings, Conclusions, and Recommendations

Introduction

The purpose of this study was to determine if there was a difference in final student grades in an introductory, undergraduate health class when an instructor used summary lecture phonecasting as a required course assignment. If a difference existed, the researcher wanted to determine if that difference was statistically significant. Descriptive statistics revealed the mean student grade in the treatment term, when phonecasting was utilized, was 2.51. This was higher than the mean student grade in control semesters, 2.29, but additional analysis was required to determine statistical significance. An analysis of covariance (ANCOVA) test was used to compare available student data for three semesters. Student data for the same instructor's Health class sections in spring 2008 and fall 2008 were used as a single control group. Student data from spring 2009 for the same instructor, when summary lecture phonecasting was assigned, was analyzed as the treatment group. Variables of interest included the dependent variable, student final grades in the course, and the independent variable, the use of summary lecture phonecasting as a required assignment. Initially, student composite ACT scores were used as a covariate in the study to account for pre-existing differences in student academic achievement. These ANCOVA results were not statistically significant at the 0.05 level. Study analysis and subsequent consultation of existing literature suggested student ACT math scores could serve as a more useful predictor of pre-existing academic achievement differences as well as student success in undergraduate

studies (Tippin, 2006). Using ACT math scores as a covariate, another ANCOVA procedure yielded results very close to the 0.1 significance level. Again, however, the null hypothesis was not rejected. While this study did not find statistically significant differences in student grades comparing students in classes utilizing summary phonecasting assignments to traditional classes, study results are promising and suggest several possible avenues for future research. Considering the effect size of the analyzed groups in this study, the ANCOVA results with ACT math scores as a covariate have practical significance which deserves further study. Additional phonecasting pilot projects are warranted to explore these dynamics in greater depth. Analysis of an instructor-provided student survey as well as an interview with the instructor provided multiple suggestions to improve subsequent academic phonecasting projects and research studies. While not statistically significant, the results of this study are sufficiently positive to justify further use of summary lecture phonecasting as a student assignment in future college courses and as the subject of similar studies in the future.

Summary of Findings

The researcher did not reject the null hypothesis for this study: That there is no significant difference in final grades, as ordinal (letter grade) variables, between students taught in a classroom utilizing student summary lecture phonecasting and students taught in a traditional classroom setting. While student grades in the treatment semester of the study (when phonecasting was used) were higher than student grades in control sections and terms, the researcher could not conclude

those differences were statistically significant. Student ACT math scores accounted for a larger percentage of the variance in student final grades than composite ACT scores, and were therefore preferable to use as a covariate in the ANCOVA procedures of this study. While the researcher did not conclude results were statistically significant, results combined with an analysis of group effect size suggest summary lecture phonecasting can positively influence student academic achievement and warrants further study as well as utilization by instructors.

Limitations of the Study

Results of this study are limited by several factors and therefore may not be generalizable to other contexts. As discussed in Chapter 1 in "Limitations of Generalizability," the fact that test subjects were not selected by random assignment limits statistical generalizability. In addition, small sample sizes may pose limitations to generalizability. The final numbers of students in the treatment and control groups (shown previously in Table 3) were 100, 110, and 147 for spring 2009, fall 2008, and spring 2008 respectively. In addition to these small sample sizes, the number of students in the control group was not in balance with the treatment group. Over twice as many students were in the control group (257) than the treatment term (100.) Separate ANCOVA procedures were included in this study for spring 2008 to spring 2009 and fall 2008 to spring 2009, when group sizes were much closer in size. Although those group numbers were closer in size, they were smaller overall and produced greater ANCOVA significance results than the combined control semester analysis. While these sample sizes are adequate for the

post-hoc statistical procedures employed in this study, a larger sample size combined with balanced group sizes could improve generalizability of a similar, future study.

In addition to addressing these limitations through a random assignment process of students to control or treatment groups in the same semester, the use of larger sample sizes with more students (especially in the treatment group) could positively address the study's limitations. Students in the present study were all undergraduate, first year college students. This is also a limitation that could be addressed in future studies by including older undergraduate students as well as graduate students. While the results of this study are positive and suggest summary lecture phonecasting may hold promise as an instructional strategy, these limitations should be carefully considered and weighed when analyzing and evaluating these results.

Another limitation of this study was its lack of analysis of the content of actual student phonecast assignments. The researcher did not transcribe submitted student phonecasts and analyze the messages which students recorded. The researcher assumed student submitted phonecasts met the requirements outlined by the instructor, but did not independently verify this through qualitative analysis. Items four and five of the podcast planning instructions provided to students by the instructor (Appendix D) specifically directed students to engage in higher order thinking to complete the required phonecasting assignment. Item four stated: "Select at least three main or most important ideas or concepts which were introduced and/or discussed during the class lecture of the day. Elaborate and

explain those main points in detail." Item five stated: "Evaluate the lesson content and predict what questions would most likely be asked on a course test or final exam concerning the lecture material for the day. Ask those questions and provide answers to them." Although higher order thinking was explicitly required by the instructor for the phonecasting assignment, the researcher did not verify submitted phonecasts actually reflected higher order thinking by students with a qualitative analysis.

The novelty effect of using podcasting, a technologically-enhanced communication method which students as well as the instructor in this study had not utilized previously, is another potential limitation which should be acknowledged. Some researchers hypothesize information is encoded better to long term memory when it is presented in novel ways rather than simply repeated (Tulving, Markowitsch, Craik, Habib, & Houle, 1996). The degree to which a "novelty effect" could account for differences in student academic achievement in the current phonecasting study is unknown.

Discussion

The small effect size (0.167) for the student groups compared in the current study, combined with the final and almost significant ANCOVA result using ACT math scores as a covariate (0.104 in Table 9) suggests the use of summary lecture phonecasting as a student assignment has practical significance which deserves further study. These results also suggest summary lecture phonecasting deserves consideration by instructors as a required assignment for students. If the effect size

for the student groups had been large, this finding of "near significance" could be more readily dismissed. Since the sample sizes of studied groups were relatively small and the effect size of the groups was small, this finding of near statistical significance (with ACT math as a covariate) points to the practical importance of this studied intervention.

The three different significance calculations of this study using ANOVA (0.159), ANCOVA with composite ACT as a covariate (0.173) and ANCOVA with math ACT as a covariate (0.104) highlight implications for academic researchers conducting similar studies. Results of this study support previous research identifying ACT math scores as a more valuable predictor of student persistence and academic success in undergraduate college studies (Tippin, 2006). Researchers conducting similar studies in the future may benefit by using student ACT math scores as a covariate instead of composite ACT scores or conducting one-way ANOVA analyses without a covariate.

Summary lecture phonecasting by students in the current study represents an operationalization of active learning by students in an environment which supports experimentation and mistakes (Dewey, 1916). In support of the recommendations of Sandifer (2009), Churches (2008), and Marzano et al. (2001) highlighted in chapter 2, summary lecture phonecasting can potentially be (depending on how it is utilized) an example of active content creation by students which supports higher levels of student achievement. The "meaningful use" of phonecasts which require students to engage in higher ordering thinking activities is a pedagogic intervention research literature suggests can improve academic

achievement. It is important to note the mere use of a phonecasting assignment does not guarantee student thinking and "student products" which are created can be categorized at the top of Bloom's taxonomy. The ways phonecasting activities are used inside and outside the classroom are essential. Phonecasting assignments which invite or allow students to simply repeat facts from a lesson remain at the lower level of Bloom's Taxonomy. Phonecasting assignments like those in this study requiring students to synthesize and evaluate information, however, explicitly support higher order thinking and the creation of knowledge products which can reflect higher order thinking. This hypothesis from the literature, although not confirmed with a "statistically significant" research finding in the current study, is still supported by its results and analysis. Like the previously cited study of student created podcasts by Lazzari (2008), the current study did not yield statistically significant results but results were still positive. The included analysis of effect size in the current study, as previously discussed, points to the practical significance of these results despite the ANCOVA result of "almost significant."

Previous research cited in chapter 2 highlights the widespread challenges universities face retaining first year undergraduate students. A wide variety of factors contribute to the high attrition rates for students at most colleges, and research indicates faculty and staff interaction can play a significant role in reducing academic dropouts (Kuh et al. 2008.) While it is not clear the use of a novel instructional strategy in the classroom like summary lecture phonecasting can constitute "enhanced faculty interaction" with students to address first year attrition issues, it appears likely the use of this instructional strategy can have a

positive impact on student academic achievement in at least some courses. The higher grades students earned in spring 2009 in this study, which were almost statistically significant when student ACT math scores were used as a covariate for analysis, suggest summary lecture phonecasting may play a positive and constructive role to enhance student learning in a given course. This supports previously cited findings by Mayer and Wittrock (1996) and Airasian et al. (2000) that the active creation of knowledge products by students facilitates retention and transfer of information. By encouraging students to engage in higher order thinking processes as they create summary lecture phonecasts, instructors can support pedagogies which have a demonstrated track record for improving student achievement.

Unlike the previously cited studies of student phonecasting projects by Schettini et al. (2010) and Wood (2010), the current study explicitly analyzed the effect of student created phonecasts on student grades. While the results from the current study are positive, additional studies are needed to further highlight results as well as best practices for student phonecasting assignments.

Student survey results as well as information gathered from the instructor interview in the present study confirm the cited findings of Hurst, Welte, and Jung (2007) that student consumption of podcasts (or phonecasts in the current case) is low when access to mobile learning devices (like iPods) is low. This result may seem obvious to outside observers, but in any event now has additional research support in the current study. It is likely summary lecture phonecasting initiatives in the future can have greater impact on student academic achievement if students are

provided with the means and with instructions to access peer-created phonecasts on their own mobile media players.

The failure of instructor-created lecturecasts to significantly improve student achievement, studied previously by Cann (2007) and Deal (2007), contrasts sharply with the current study. Rather than using podcasting and phonecasting capabilities to reinforce a teacher-directed, instructionist paradigm of learning in the classroom criticized by Papert (1993), summary lecture phonecasting in this study opened a door to student-created content in the classroom and the university which is direly needed. Constructivist learning theorists like Dewey (1916) and Freire (1999) support fundamental changes in educational paradigms which historically have remained teacher and textbook focused. The knowledge, experiences, and perceptions of students are essential to consider and bring into the learning process as individuals construct new as well as amended mental models of ideas and skills. Student created content must play a foundational role in this paradigm shift. Although the use of lecture summary phonecasts in the current study did not represent a tectonic shift in the overall presentation and "delivery" of the HEALTH101 course to students, it did represent an opening to student created content as a required course requirement which could be replicated in other programs. The high level of practical significance of the current study in positively influencing student academic achievement in HEALTH101 courses at USM should get the attention of instructors, educational administrators, and academic researchers.

Suggestions to Improve Future Phonecasting Projects

Analysis of both the student end-of-course phonecasting survey results and the researcher's interview with the instructor of students analyzed in this study suggests ten different ways similar phonecasting projects at the university level could be improved in the future.

First, the college or university should provide headphones or speakers in computer labs where students access the Internet and online course materials via the institution's learning management system. In the case of this study, the lack of institutionally provided headphones or speakers was identified by students as an obstacle preventing ready access and consumption (in this case, listening) to peer-created summary lecture phonecasts.

Secondly, phonecasting studies should be conducted for students in "1 to 1" settings in which each student is already provided or required to utilize a laptop computer. In the university which students attend who participated in these spring 2009 phonecasting activities, students are not required to provide or provided with a personal laptop computer. While data was not collected on the number of students who own their own laptop computer or their own desktop computer at home in the present study, survey results indicated some students relied on university-provided lab computers to access online course materials. The impact of phonecasting projects on student learning may be greater in academic environments in which computing resources (laptops as well as smartphones or other mobile learning devices) are more ubiquitous and readily accessible by students.

A third suggestion to improve phonecasting projects is to encourage the use of smartphones and podcatching software (like iTunes) among students. In the current study, relatively few students (8%) subscribed to class phonecasts with podcatching software like iTunes, and an even smaller number of students (4%) utilized mobile devices to listen to phonecasts. The rising popularity of smartphones like the iPhone which permit "untethered" podcast channel subscription using free applications like Podcaster.fm, present greater opportunities for university faculty to increase digital accessibility of course-related content for students (Fryer, 2011a). Institutions which require students to have both a laptop computer as well as a smartphone are ideally suited to implement similar phonecasting initiatives. Increasing use of smartphones by students at all universities, however, could potentially be leveraged to enhance access to and utilization of classmate-created as well as instructor-created phonecasts.

A fourth suggestion to improve phonecasing initiatives as class assignments is to more tightly integrate the sharing of recorded phonecasts into the existing learning management system of the institution. In the case of this study, free websites were utilized (Gabcast.com and Wordpress.com) to provide students with phonecasting options as well as an environment where students could comment on peer-published phonecasts. Free websites have drawbacks, however, and the fact that Gabcast.com discontinued its free phonecasting service reflects one of these disadvantages (Gabcast.com News, 2010). By utilizing a phonecasting solution more tightly integrated into an institution's learning management system, student access as well as subscription to classmate phonecasts could be enhanced. Phonecasts

could also be archived locally and thereby preserved for the future, in the event a third-party phonecasting or blogging service is discontinued like Gabcast was.

A fifth suggestion to improve future phonecasting projects, offered by the instructor of students in this study, is providing students elective choice in the week and topic for their phonecast. The instructor believed this change to the phonecasting assignment might increase student motivation to both complete the phonecasting assignment as well as create a higher quality summary phonecast for classmates.

Sixth, instructors and college technology support staff in future phonecasting initiatives could provide more explicit instructions and out-of-class technical support for students wanting to subscribe to course phonecasts on their smartphone, laptop, or other mobile learning device. In the spring 2009 term which is the focus of this study, students were not provided with out-of-class technical support options relating to phonecasting. Some students had difficulty listening to peer phonecasts at all, since college-provided computers in labs lacked speakers or audio headphones. Departmental or college-specific support of phonecasting initiatives which include both required hardware to listen to phonecasts (speakers or headsets) as well as technical support for students creating and subscribing to phonecasts could also improve future projects with similar goals.

Seventh, the instructor suggested students could be given the option to create a vodcast (video podcast) instead of a phonecast for their assigned lecture summary assignment. Increased student use of smartphones with video

recording/playback/publishing capabilities as well as audio playback functions could open the door to this further enhancement of a phonecasting assignment.

The instructor also suggested an eighth idea for project implementation improvement: Have the instructor record an initial lecture summary phonecast and discuss the ways it is a "best practice" phonecast afterward with students. In the case of this spring 2009 pilot project, the instructor did discuss summarization skills and procedures with students in class after listening to initial student phonecasts. It might be even more effective and powerful, however, for the instructor to create an initial summary phonecast and thereby model “best practices” for students.

A ninth suggestion for phonecast project improvement is to have the instructor (or a teaching assistant) regularly listen to student phonecasts during the term and highlight in class phonecast summaries which were particularly valuable and well done. Analysis of the current phonecasting study was limited by the lack of student-specific data on phonecast listening behavior. With larger sample sizes and student-level data on phonecast listening frequency, a more sophisticated statistical analysis could be conducted which could better isolate the specific effects of peer phonecast listening (or consumption) instead of the combined effects of phonecast creation and listening included in the present study.

Finally, future phonecasting studies could include a qualitative analysis of student submitted phonecasts. Speech to text technologies could be employed, and subsequently checked for accuracy by a human researcher, to transcribe recorded audio phonecasts into text. Those text transcriptions could be analyzed using a framework based on Bloom’s Taxonomy to identify how much higher order thinking

skills (especially synthesis and evaluation) were reflected in the student phonecasts. This qualitative analysis could test the validity of the assumption used in the present study that students completing the instructor-assigned phonecasting activity engaged in higher order thinking about course content and reflected that thinking in the "knowledge product" they created to fulfill course requirements.

Conclusions

Using the results of this exploratory study as a guide, university faculty and administrators should explore expanded uses of summary lecture phonecasting assignments for students. The growing number of cell phones owned by college students, combined with the availability of commercial phonecasting services for educational use, make this learning and assessment activity for students more practical than ever.

In designing and implementing these studies, however, it is important for researchers to consider whether or not it is "the medium that makes the magic" (improved student academic achievement) or the pedagogical strategies themselves. Research literature cited in this study suggests it is the pedagogy rather than the medium which produces improved achievement results. This distinction is essential. Without it, observers might erroneously attribute credit to technology (a device or method, in this case, phonecasting) rather than pedagogy for improved academic achievement. To address this potential pitfall, future controlled studies should include groups which implement a pedagogic intervention without technology. An example could be student discussion groups which use paper-based,

easel drawings to create "knowledge products" of synthesized thinking instead of phonecasts. By designing studies in this way with two treatment groups and one control group, researchers can further isolate and identify the degree to which pedagogy and technology uses contribute to improved student achievement results. Just as Larry Cuban Cuban concluded "no credit for enhanced efficiency in learning and teaching measured by academic achievement can be confidently attributed to greater computer access at school," the researcher concludes improvement in student achievement in the present study cannot be "confidently attributed" to phonecasting as an isolated, de-contextualized technology tool (2002). Only when understood contextually, as a means to communicate and document student higher order thinking, can the potential of summary lecture phonecasting to positively contribute to improved student learning outcomes be properly understood.

The levels of ambiguity and risk which characterize a phonecasting assignment are essential to analyze to understand this context of use as well as potential impact (Doyle, 1983). To be a classroom task which facilitates student understanding, a phonecasting assignment should be characterized by both high ambiguity as well as high risk. As an "ambiguous" assignment, students should not have a precise roadmap to create their own knowledge products. This ambiguity encourages students to engage in higher order thinking. If the instructor or teacher does not assess and validate student answers during the assessment phase, however, the phonecasting assignment may reflect low "risk" (again according to Doyle) and therefore tend to reflect student opinions rather than student understanding of studied material. In the currently analyzed phonecasting study,

the instructor treated the assignment as a "pass / fail" grade and did not individually assess the content of student phonecast submissions for accuracy. For this reason, this phonecasting assignment likely reflected high ambiguity but low risk. Since student perceptions of risk and ambiguity were not assessed by the instructor or researcher in this case, it is not possible to test this hypothesis. In the future and in subsequent studies, the researcher recommends instructors assess the content of submitted phonecasts to raise student perceptions of the assignment's risk. The researcher also recommends assessing student perceptions of ambiguity as well as risk, to determine if those perceptions affect the type of information processing which is encouraged by the assignment. According to Doyle's framework of academic tasks and ambiguity/risk, this should increase the likelihood students will engage in higher order thinking and process information at deeper levels. This should contribute to better student understanding and may positively correlate to improved student achivement.

Similar studies of summary lecture phonecasting assignment effects should be undertaken at the primary and secondary levels, as well as further studies at the college level. Student access to technologies which not only enable mobile consumption of media, including phonecasts, but also the mobile creation and sharing of media, offers opportunities for well-grounded pedagogical uses inside and outside the classroom. Universities and colleges which develop procedures and mechanisms for student phonecasting projects should share not only these results globally, but also access to these technological systems locally with public and private schools. These university / K-12 partnerships may yield beneficial results

for all constituents in the form of increased student achievement as well as useful contributions to the field of academic research related to effective technology integration.

If a university faculty member chooses to use summary lecture phonecasting as a required assignment for students, results of the present study offer several recommendations for future uses. These recommendations, summarized in the previous discussion section, range from institutional support options (like providing headphones for students in college computer labs) to different instructor procedures like creating the initial summary phonecast as an example for students. By implementing some or all of these suggestions, future phonecasting projects as well as studies may yield improved results.

Recommendations for Future Study

The instructional strategy utilized by the instructor examined in this study has strong pedagogic and research-based support. The process of creating a summary lecture phonecast can require students to utilize higher level thinking skills, particularly when the students' perceived ambiguity and risk of the assignment are high (Doyle, 1983). Students analyzing an instructor's lecture, to determine key points and testable concepts, can perform a creative act at the top of the 2001 revision of Bloom's taxonomy discussed in Chapter 2. While the results of the present study were not statistically significant, the results were positive and extremely close to the 0.01 significance level. The small effect size of studied groups

highlights the practical significance of these findings. These promising results call for additional studies. There are multiple ways students can subsequently share the results of their lesson summary and lesson analysis, however, and these alternative platforms should also be explored.

One disadvantage of phonecasting, highlighted by results from the instructor's end-of-course student survey, is the relatively longer amount of time required to listen to an audio-based student response instead of more quickly reading or scanning a text-based student response. Because of this difference in instructor time requirements, future researchers should consider designs in which some student sections share their lesson summaries on a text-based blog instead of using a phonecast. Future researchers should study if benefits to student academic achievement (measured by student final grades) exist for summary lecture blogging as well as summary lecture phonecasting. The work of Canadian secondary math teacher Darren Kuropatwa with "student scribe blogs" is exemplary and could be used as a model in future projects and studies (November, 2010). To address the issue of needing additional time to assess a spoken instead of a written assignment submission, instructors and researchers could utilize speech-to-text conversion web services. iPadio (www.ipadio.com) is a phonecasting service offering free transcriptions of audio to text. Google has significantly improved the "automatic captioning" for YouTube videos (Harrenstien, 2012). As speech-to-text capabilities like these continue to improve they should be tested for use in audio assessment contexts. Instructors and researchers should be aware, however, of transcription

errors which persist with automated systems unable to completely understand different accents and dialects.

It would also be beneficial to conduct similar studies measuring the impact of student summary lecture phonecasting with students at different grade levels and college years. Researchers should explore the effects of summary lecture phonecasting on high school students, as well as university students in their upperclass years (undergraduate juniors and seniors) as well as graduate students. It would be worthwhile to explore if these benefits are limited to students in college or younger students could also benefit from assignments involving summary lecture phonecasting. The research literature suggests constructivist, hands-on approaches for processing lesson content can be beneficial for learners of all ages. The technical and practical difficulties of accurately and thoroughly completing a summary lecture phonecasting assignment may be better suited to older students, however, and it would be helpful to explore as well as test that hypothesis.

Future researchers should consider documenting specific details about how much students access or do not access the summary lecture phonecasts of their peers to support their own learning. In the present study, detailed statistics are not available concerning the number of times students accessed and listened to phonecasts recorded by their classmates. The literature and study results support the hypothesis that the act of summary lecture phonecasting is academically beneficial to the specific student who creates the phonecast. It would be valuable to explore, however, the potential impact on student academic achievement of students listening regularly to each others' lecture summary phonecasts. If

phonecasts could be shared within an interactive, online social environment they could contribute more directly to socially invented learning among students. As phonecasting technologies and systems improve and more easily facilitate publishing as well as access and consumption of phonecasts, studies of this type can become more practical.

Researchers interested in phonecasting should also explore and compare different systems available for logistically facilitating both the phonecasting creation process as well as the steps required to access phonecasts. The growing use of smartphones and smartphone applications can substantially facilitate both these sides of phonecasting. Ideally, it would be helpful for researchers to study classrooms of students equipped with smartphones and provided with instructions on not only creating summary lecture phonecasts, but also readily "subscribing" to class phonecast channels which include peer-authored phonecasts. Better availability of classmate phonecasts on smartphones possessed by every student in a given class might increase the positive effects of phonecasting on student achievement. Smartphone applications like Tumblr (www.tumblr.com) which support direct recording and publishing of audio files to a shared "channel" or website could streamline the process of sharing audio among class members. Although not technically a "phonecast," audio shared from a smartphone application like Tumblr could pedagogically serve the same purpose as a phonecast. Further research will be required to test these ideas, however.

Future studies could also explore the effects of students' comfort level with the use of technology and academic phonecasts. While the creation of academic

phonecasts can require comparably less technology skills than audio podcasts created with microphones and software, the steps required to access and listen to classmate-recorded phonecasts are possibly intimidating for students. Differing student levels of comfort with technology could, therefore, influence the implementation of phonecasting projects and warrant further comparative study. As faculty design phonecasting creation and access procedures for students, they should be mindful of "the ethic of minimal clicks" which predicts larger quantities of student media production will result when the relative number of mouse clicks (or touch tablet gestures) required to complete a given technology task is smaller (Fryer, 2011b).

One of the most important ways further studies on summary lecture phonecasting could highlight the importance of sound pedagogy over new technology innovations would be a controlled analysis of students in three different groups. Like the present study, one group of students could utilize phonecasting for summary lecture audio sharing while a second group could serve as a control. A third study group, however, could use a non-technological method for creating and sharing lesson summaries. These could be written summaries or summaries shared via small group discussions. This study design could further isolate the value and importance of constructivist pedagogic strategies in contrast to technological ways of sharing and communicating.

Since phonecasting is a new technology method and may have different effects on student learning because of this novelty, it would be helpful for future researchers to study the relative effect of summary lecture phonecasting over time.

As students as well as instructors grow more familiar with phonecasting, it would be valuable to learn if beneficial effects persist or fade.

Last of all, it would be valuable for future researchers to contrast the effect and value of students creating video summaries of lectures instead of audio-only summaries. Instead of simply summarizing lecture content, students could be required to create a video integrating interviews with people outside the college or school community who utilize or have utilized a skill or concept addressed in a class lecture. In this way, students could be required to make connections between "the real world" outside the academic context and the issues of the course. Constructivist learning theory postulates these kinds of connections are extremely valuable for deep learning and transfer (Brooks & Brooks, 1999). As smartphones with video recording capabilities continue to grow in power and ubiquity, these kinds of course activities as well as research studies will become increasingly practical.

In future studies, researchers should continue to identify underlying pedagogies utilized by instructors to promote learning as distinct from the technologies employed. Just as past researchers were unlikely to ever conclude, "The pencil was uniquely responsible for great classroom learning and student achievement," responsible future researchers will not attribute learning gains to a new technology like a phonecast or a tablet computing device. While these tools can and certainly will open new doors of opportunity for interaction and access, the ways they are employed by teachers as well as students is likely to have the greatest impact on their utility for learning.

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Appendices

A: HEALTH101 Course Syllabus

HLTH 1112: Healthy Life Skills

(CRN 21504 – Spring 2009)

Instructor: [Name] **E-mail:** name@usm.edu
Class Location: EDU 102 **Class time:** TR 1:00–1:50 p.m.
Office Location: Library [Number] **Office hours:** Monday 12:00-1:00/2:00-3:00
Wednesday 2:00-3:00
Thursday 11:00-12:00/2:00-3:00
By appointment

GENERAL CLASS GUIDELINES

*****Show up. Show respect. Make an effort.*****

Come to class. Clearly, you are in college now, and can decide for yourself whether or not to come to class. However, my job is to teach you and I cannot do that if you are not present. There will be class demonstrations, discussions, and films designed to enrich your learning experience. There will be in-class assignments that will count towards your grade. And further, the text for this course is thick with information: coming to class will help clarify concepts and focus your studying.

Be considerate. Ultimately, I cannot make you pay attention and I cannot make you learn. However, I will do what I can to keep anyone from taking that opportunity away from those around him or her. In other words, if you are not in the mood to pay attention and would rather read the newspaper, visit with your neighbors, text message, or surf the internet, just do not come to class. If you are disrupting class, you will be asked to leave. Also, I hope to have some discussion in class, despite the size of the class, which means that I encourage you to speak up in class. With freedom comes responsibility, and so I also encourage you to use discretion and consideration when commenting – we do not all share the same views and upbringing. **ABOVE ALL, I expect that you will come to class with respect for me, as well as for your classmates.**

Take notes. Come to class and take GOOD notes. It is a good study habit to go over your notes right after class, filling in the blanks, clarifying concepts and cryptic scribbles while the lecture is still fresh in your mind. You will not get all the information that you need for the exams from the lecture notes. It is also a good idea to make friends in the class and get the phone numbers of a couple of people on whose notes you can rely when you have to miss class (and to clarify your own lecture notes).

Communicate with me. At a larger university like this one, it is too easy for students to get "lost." I encourage you to come by my office during my office hours and introduce yourself or talk to me after class; you will get more out of this class if you feel like your investment in it matters. You may also e-mail me at <name@usm.edu>, including the CRN in the subject line. Please note that I will respond to legitimate requests (i.e., not questions such as "did I miss anything important today in class") as soon as possible (i.e., *usually* within one school day – excepting university holidays). I will not provide confidential information (e.g., exam scores) via e-mail.

CLASS SCHEDULE
The following schedule is tentative and subject to modification *with* notice by the instructor.

DATE	DAY	Chapter-Reading Assignment	TOPIC/ACTIVITY—Due Dates in BOLD PRINT
Jan. 13	TUE		Introduction to the course- Getting to know each other-**NOTECARD**
15	THU	1	Intro. to Wellness, Fitness, and Lifestyle Management Group Work-
20	TUE	1	**HLS-1** Intro.- Behavior Change Assignment
22	THU	10	Discussion- Wellness, Fitness, etc. Intro.- Stress
27	TUE	10	Stress - Lab
29	THU	10	QPR (HLS 16,17,18,19)
Feb. 3	TUE	11	Cardiovascular Health- **Online Quiz**
5	THU	12	Cancer
10	TUE		**Case Study #1**- Review for Exam
12	THU	1,10,11,12	**Behavior Change Assignment** **Exam #1-** Chapters 1,10,11,12
17	TUE	2	Principles of Physical Fitness
19	THU	3	Cardiorespiratory Endurance
24	TUE	4	1.5 Mile Run-Walk Test- **Lab Activity pg. 85-87** **Meet at the Wellness Center*
26	THU		Muscular Strength/Endurance

		4	Discuss Lit. Review
Mar. 3	TUE	5	Flexibility- **Online Quiz**
5	THU	6	Body Composition- Lab
10	TUE	6	**Chapter 6 Jeopardy-** Review for exam
12	THU	2,3,4,5,6	**Exam #2-** Chapters 2,3,4,5,6 **Lit. Review Due**
24	TUE	8	Nutrition
26	THU	8	Nutrition Discuss Calorie King Assignment
31	TUE	8-9	Nutrition Weight Management **Case Study #2**
Apr. 2	THU	9	**Calorie King-(HLS 3-4)** Weight Management **HLS-6**
7	TUE	9	**No Class-** work on My Student Body
9	THU	13	Substance Use and Abuse Discuss My Student Body
14	TUE	13	Substance Use and Abuse
16	THU	14	Sexually Transmitted Infections- **Sexual Health 101(HLS-15)**
21	TUE		Review for Exam
23	THU	Pencil & Green Scantron	Exam #3- Chapters 8,9,13,14 **My Student Body- (HLS-13&14)**
28	TUE		Course Wrap Up
30	THU		Review for Final
		Pencil & Green Scantron	Comprehensive Final Exam

Other Important Info:
Make-Up Exam: All missed exams will be made up on May 1st @ 10:00 A.M. Location TBA
WebCT: You must use WebCT for this course- I will use the gradebook, so you will always know what grades I have recorded. Please take responsibility for every assignment and grade. I have been known to make mistakes! Therefore, check the gradebook regularly to ensure there are no discrepancies. If you aren't comfortable with WebCT, come see me and I'll help you get started! (Many of your assignments will only be given through WebCT).
Tardies: Do not make it a habit and it won't be an issue. You are expected to arrive ON TIME and stay until class is over. I will make sure we are finished with class ON TIME and you are expected to be present until class is over. Two (2) early departures will count as an absence.
Writing Assignments: All assignments are expected to be typed and should be written using proper spelling and grammar.
Podcast Assignment: This is worth 30 points, so please refer to additional handouts for details.

B: Instructor-provided End-of-Course Phonecasting Questionaire

CourseCasting End-of-Term Survey: SPRING 2009

1. What is your [UNIVERSITY NAME] Healthy Life Skills Section? (Circle One)

20797 (MW 1 pm) – 20796 (TTh 12 pm) – 21504 (TTh 1 pm)

2. Did you listen to any of the recorded lecture summaries (coursecasts / podcasts) created by your classmates this semester? (Circle One)

YES – NO

On a scale of 1 to 5 please rate the following statements.

3. Recorded coursecasts / podcasts helped me understand the material and do better on course tests.

1 – 2 – 3 – 4 – 5

NOT helpful – Neutral – VERY HELPFUL

4. The process of having to record a coursecast / podcast during the week I was assigned to do it helped me learn the material that week better.

1 – 2 – 3 – 4 – 5

NOT helpful – Neutral – VERY HELPFUL

5. This project was worthwhile overall and should be repeated next semester with more students.

1 – 2 – 3 – 4 – 5

strongly DISAGREE – Neutral – strongly AGREE

6. Did you subscribe to the recorded lecture summaries (coursecasts / podcasts) in iTunes or another software program on a computer? (Circle One)

YES – NO

7. Did you listen to any recorded lecture summaries (coursecasts / podcasts) on an iPod, iPhone, or other portable audio player? (Circle One)

YES – NO

8. How often did you listen to recorded coursecasts / lecture podcasts? (Circle one.)

More than once per week - Around once per week - Only a few times - None

Please share any other comments or feedback about this project which you may have on the back of this page. Your input is appreciated and will be used to determine if this project is repeated and how it is implemented. THANKS FOR YOUR TIME!

C: Summary of Student Questionnaire Responses

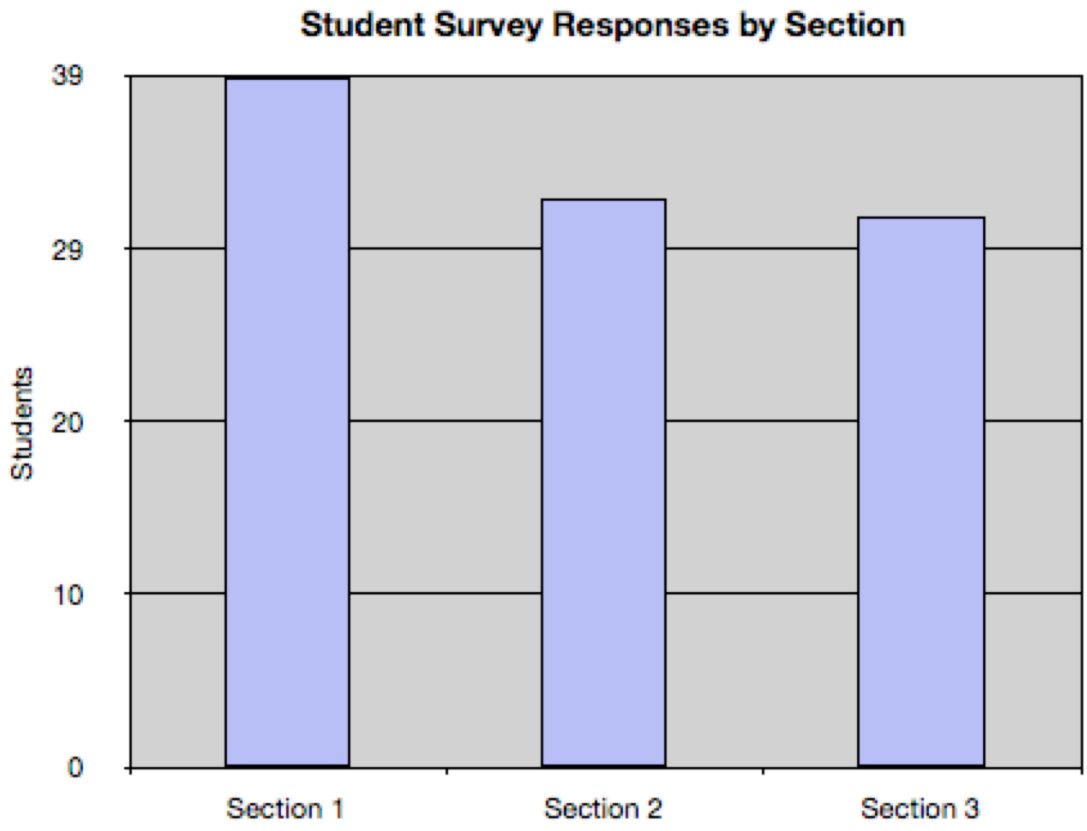
The following are results from the instructor survey conducted at the end of the Spring 2009 term. The original survey is included as Appendix B.

105 students responded to the survey, however 3 submissions were incomplete. Data is summarized below for the 102 complete student survey submissions.

1. What is your UCM Healthy Life Skills Section? (Circle One)

20797 (MW 1 pm) – 20796 (TTh 12 pm) – 21504 (TTh 1 pm)

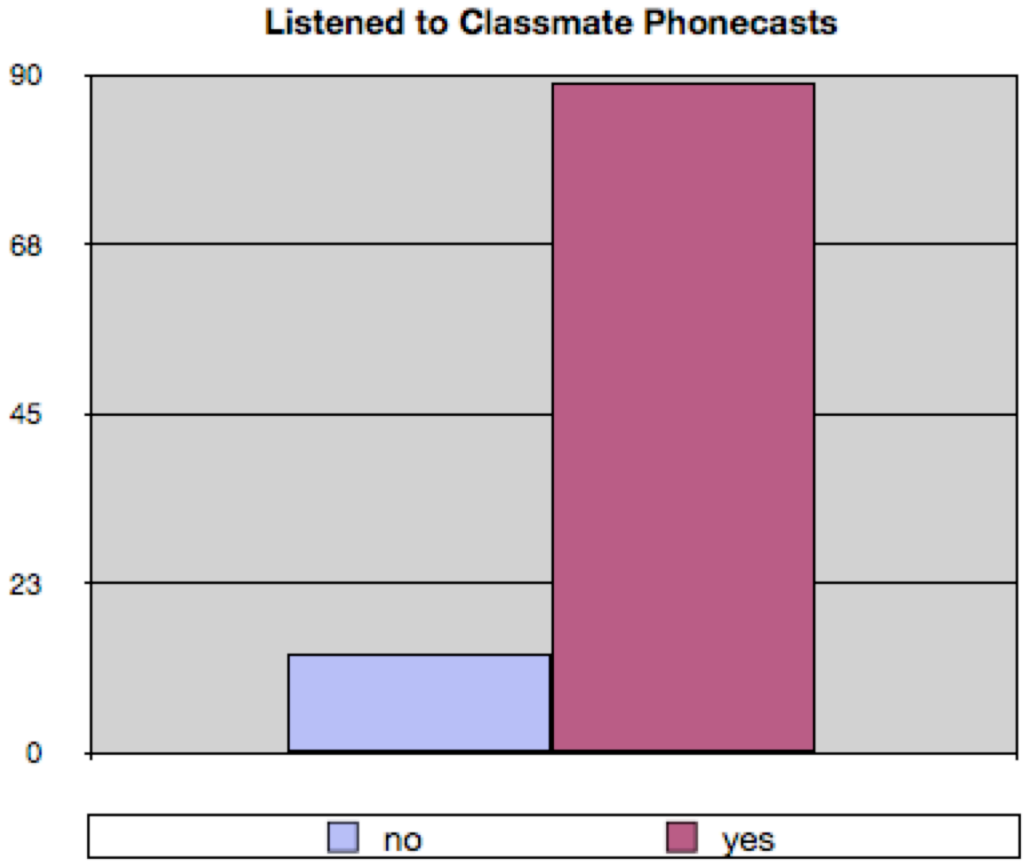
	# Students
Section 1	39
Section 2	32
Section 3	31
Total	102



2. Did you listen to any of the recorded lecture summaries (coursecasts / podcasts) created by your classmates this semester? (Circle One)

YES – NO

	# Students	% of Students Responding
0 - no	13	12.75%
1 - yes	88	86.27%



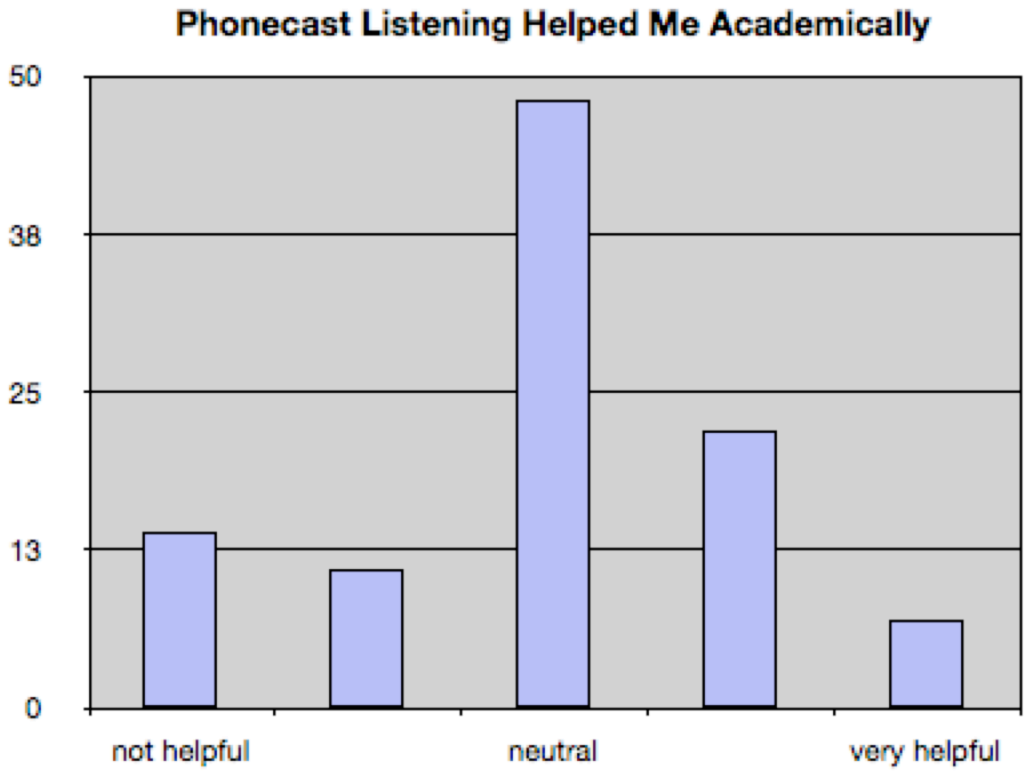
On a scale of 1 to 5 please rate the following statements.

3. Recorded coursecasts / podcasts helped me understand the material and do better on course tests.

1 - 2 - 3 - 4 - 5

NOT helpful - Neutral - VERY HELPFUL

	# Students
not helpful	14
	11
neutral	48
	22
very helpful	7

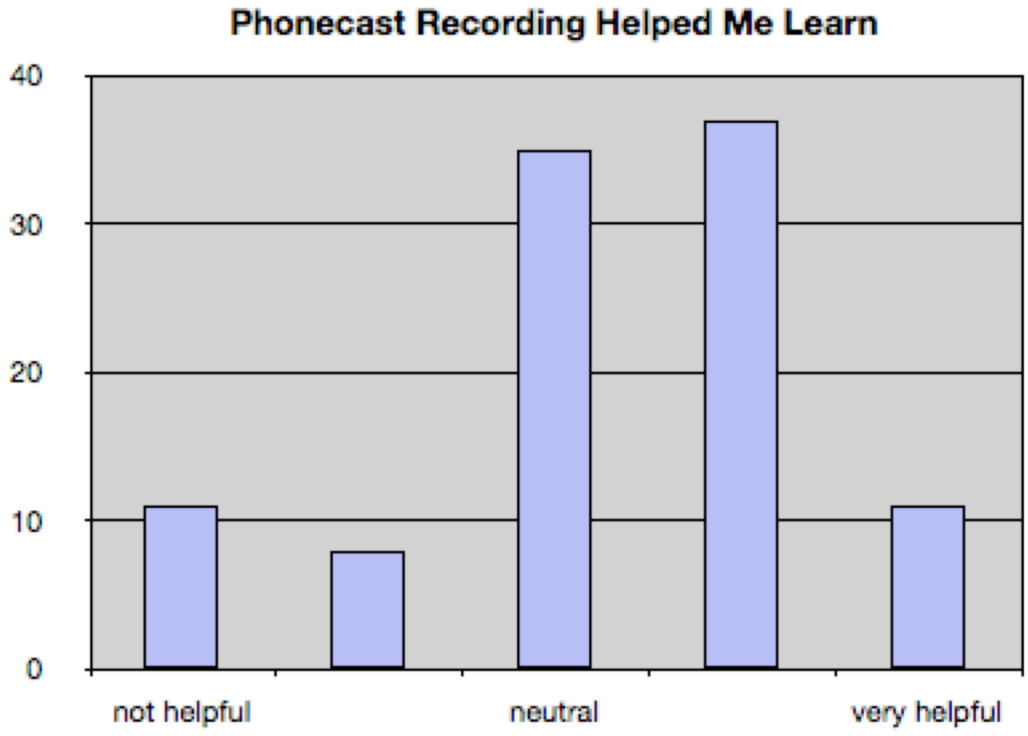


4. The process of having to record a coursecast / podcast during the week I was assigned to do it helped me learn the material that week better.

1 - 2 - 3 - 4 - 5

NOT helpful - Neutral - VERY HELPFUL

	# Students
not helpful	11
	8
neutral	35
	37
very helpful	11

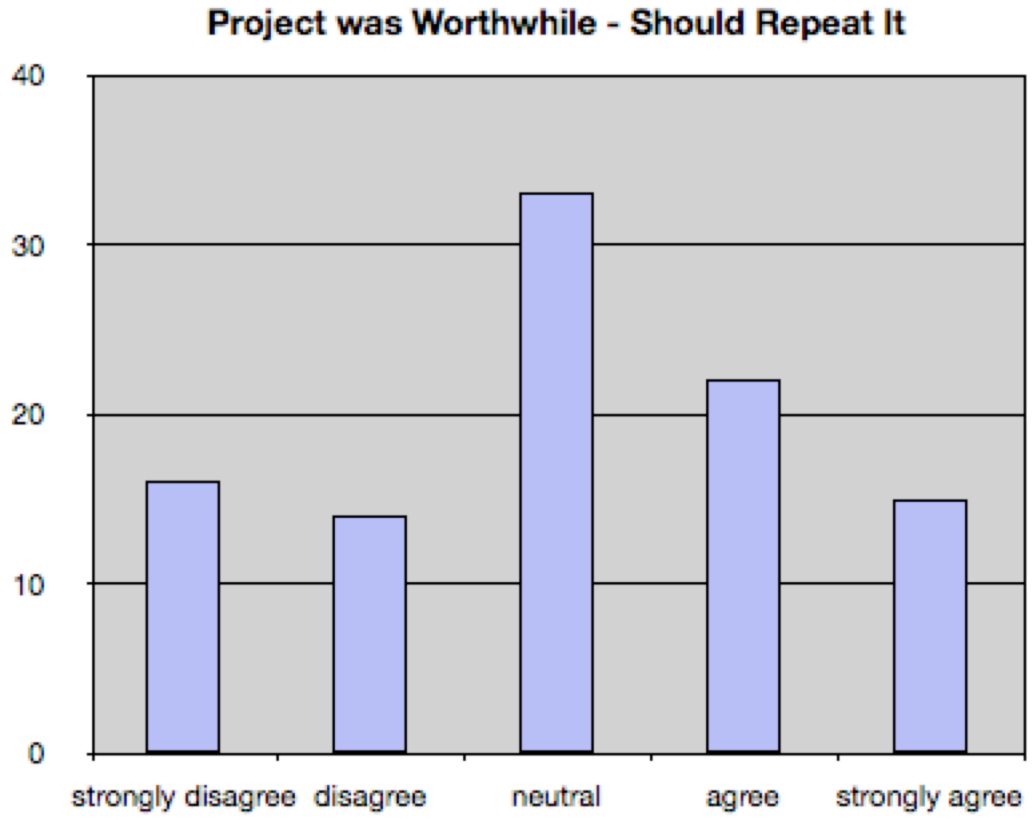


5. This project was worthwhile overall and should be repeated next semester with more students.

1 - 2 - 3 - 4 - 5

strongly DISAGREE - Neutral - strongly AGREE

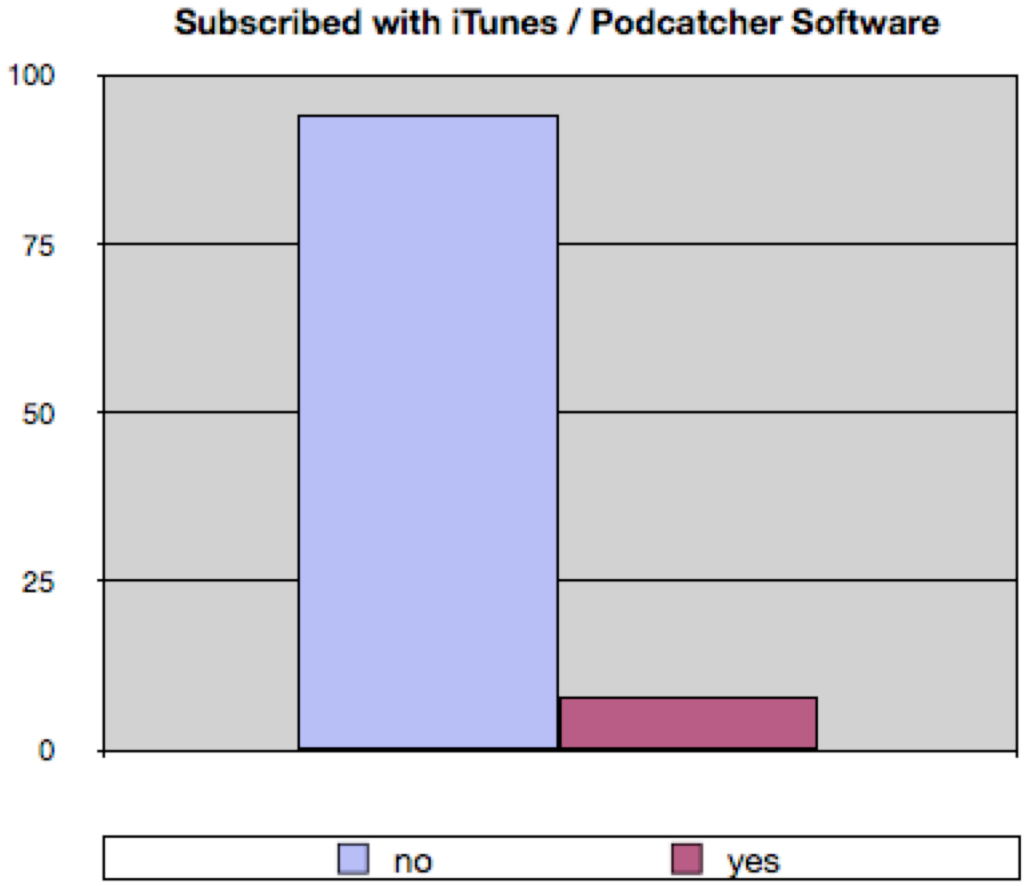
	# Students
strongly disagree	16
disagree	14
neutral	33
agree	22
strongly agree	15



6. Did you subscribe to the recorded lecture summaries (coursecasts / podcasts) in iTunes or another software program on a computer? (Circle One)

YES – NO

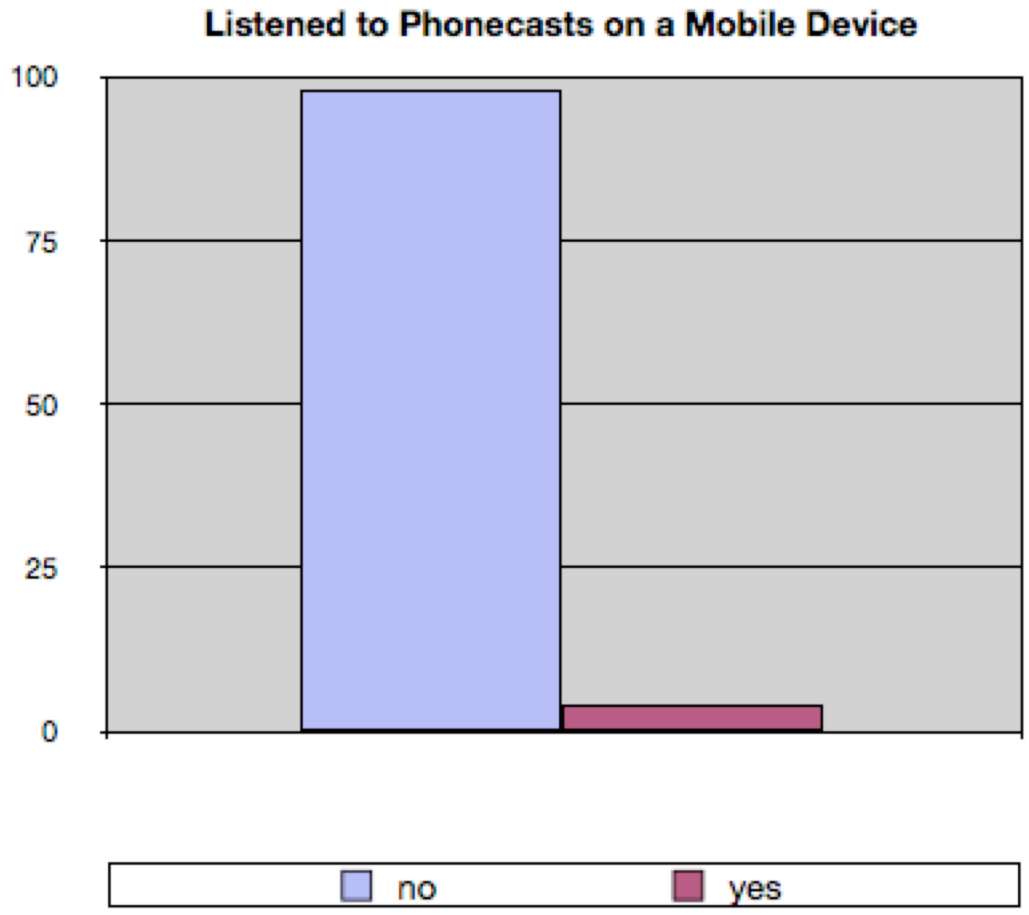
	# Students
no	94
yes	8



7. Did you listen to any recorded lecture summaries (coursecasts / podcasts) on an iPod, iPhone, or other portable audio player? (Circle One)

YES – NO

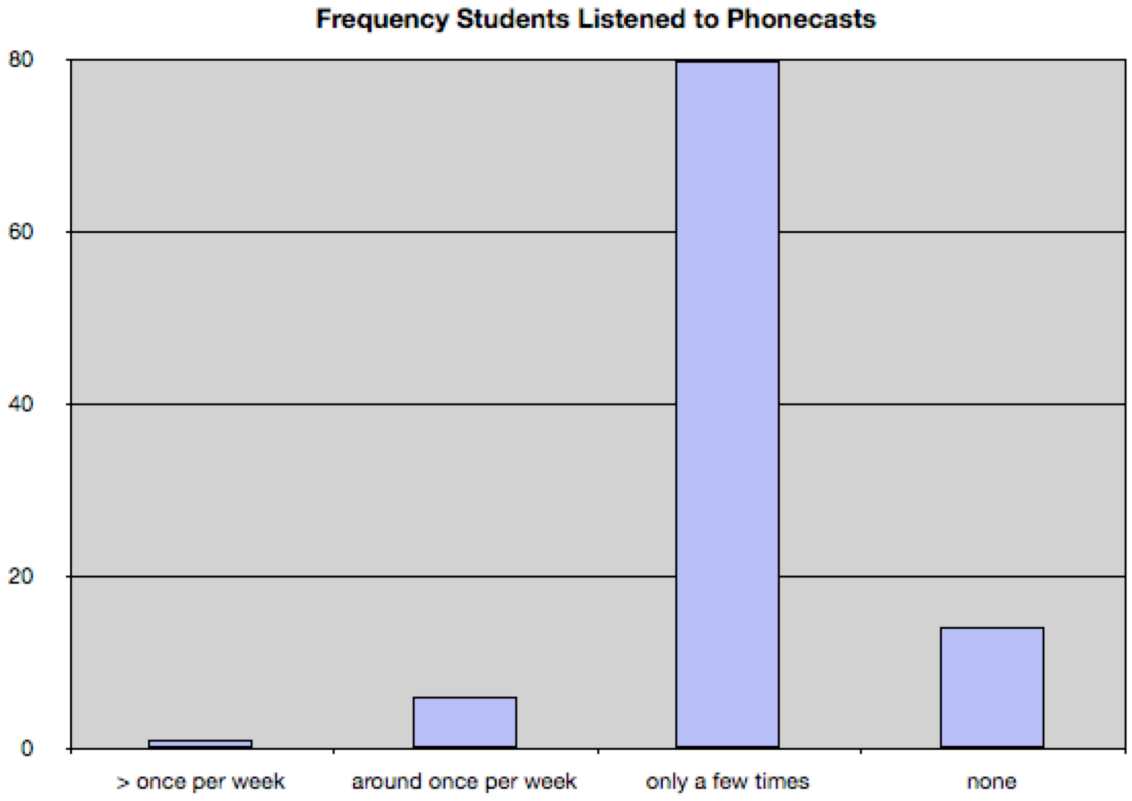
	# Students
no	98
yes	4



8. How often did you listen to recorded coursecasts / lecture podcasts? (Circle one.)

More than once per week - Around once per week - Only a few times - None

	# Students
> once per week	1
around once per week	6
only a few times	80
none	14



Student Survey Comments

Positive (8)

I think this is a solid idea.

Do this again! It works!

Great way for students who missed class to still have access to the material they missed out.

The podcasts are great. It helps the students get info even if they are not able to get to class.

The podcast was a great way to learn new material and should be used again!
It was very helpful for us to get to know all the summary of the class which was taught in a day.

I thought it was helpful when I was studying for the final. It was a good review tool, especially because I am an auditory learner and sometimes just hearing it helps me a little more.

I liked the podcast. It made us research a certain topic more in depth and helped in case we missed a class.

It was helpful to a certain point. Some people weren't very understandable and would leave out vital parts that you needed to know. Overall it was a good idea for people who were absent that day to listen to them. Better something than nothing.

Negative (5)

The podcast assignment didn't interest me enough to do it. It could be helpful for those students who missed students regularly and don't want to read the material. However I feel like I did not benefit

It was too hard to remember and the whole website and process seemed bootlegged. All it did was hurt my grade!

I honestly forgot about the podcasts and never used them to help in class. I found reading and looking at slides from my professor helped me more. I am an extremely visual person. I did not find this activity helpful.

Was too confusing, maybe if teacher did them it would be different

Incredibly not helpful, it was easy grade so I'm all for it altogether. Too inconvenient for its negligible value. Maybe a similar system with text that can be printed would be useful, but the lack of audio capabilities on campus computers placed undue burden on students.

Constructive (2)

I think it was a good idea that people recording needed to put more time into. Some were great and some were so-so. :-)

The website needs a different layout. It was hard to find the different days.
I think that most students assigned to this just went on the website and looked for the shortest summaries, and made a short comment not really relating to the material.

Other (5)

Easy grade, but only particularly helpful if you missed a class

I think it's good, I just forgot about it so I didn't use it.

I missed class on my day and never made it up.

Good concept, however most students are lazy and will not bother checking the casts. It may be ahead of its time right now.

My phone wouldn't work for the number so it was more time consuming than I'd hoped.

D. Instructor-provided Phonecasting Assignment Instructions

(see the following three pages)

Student Summary Podcast Instructions

Instructor - HEALTH101 - Section 20797 – Spring 2009 – MW 1 pm

This semester you will be responsible for recording ONE (1) "summary podcast" of one of our course lectures and listening/leaving a comment on FIVE (5) summary podcasts created by other students. The class date for which you are responsible is:

_____

This recorded audio summary:

1. Must be 10 minutes in length or LESS.
2. Must be recorded **the same day** as the class lecture, NO LATER THAN 11:30 pm.
3. Will be recorded using your PHONE and the phone number, channel code, and password indicated below.
4. Will count as an assignment during the semester.

When planning your summary podcast BEFORE recording:

1. Plan to first introduce the podcast by reading the following script with the blanks filled in appropriately: "Hi, this is [YOUR NAME], and this is a summary podcast for class on [DATE OF CLASS] of UCM Healthy Life Skills Section 20797."
2. Using a conversational and professional style, give an overview of the class lecture focus for the day in several sentences.
3. Speak slowly and clearly.
4. Select at least three main or most important ideas or concepts which were introduced and/or discussed during the class lecture of the day. Elaborate and explain those main points in detail.
5. Evaluate the lesson content and predict what questions would most likely be asked on a course test or final exam concerning the lecture material for the day. Ask those questions and provide answers to them.
6. Reference (state) the pages in the textbook which correspond to the topics and ideas you discuss in your summary podcast, as you mention them in your recording.

To record your summary podcast:

1. Call the phone number **1-888-887-3127**. (This is Gabcast's toll-free number.)
2. Enter the channel number: **25955** and then the pound key (#).
3. Enter the channel password: ******** and then the pound key (#).
4. Press 1 to create a new recording / episode.
5. Record your summary podcast.
6. Press # to end your recording.
7. Press 2 to publish the recording online.
8. Hang up.

All students in our course section will be able to access these recordings via our course podcast blog linked on WebCT. You are encouraged to access the summary podcasts of your fellow students and use them as you learn the course material and prepare for tests.

Student Summary Podcast Assignment

Instructor - HEALTH101 - Section 20797 – Spring 2009 – MW 1 pm

Use this page to complete your student summary podcast assignment. When finished, this completed sheet should be turned into your instructor for assignment credit.

Your Name: _____

Date of class lecture you summarized as a recorded podcast: _____

Episode Number of your recording: _____

Remember to reference (write) the page numbers in the textbook which correspond to topics you discuss in your summary podcast, as you mention them in your recording.

Three main points / most important ideas discussed during the lecture. (Continue on the back of this page if needed.)

Predict test questions and answers which could be asked based on this material. (Continue on the back if needed.)

Date and time of summary podcasts created by OTHER students to which you LISTENED and WROTE a BLOG COMMENT for:

1. Podcast date/time / Episode #: _____ / _____
2. Podcast date/time / Episode #: _____ / _____
3. Podcast date/time / Episode #: _____ / _____
4. Podcast date/time / Episode #: _____ / _____
5. Podcast date/time / Episode #: _____ / _____

Student Summary Podcast Listening Options

Instructor - HEALTH101 - Section 20797 – Spring 2009 – MW 1 pm

This page lists different access options you have for listening to and commenting on summary podcasts created by you and other students in your course section.

BLOG WEBSITE
The blog website of your course section's summary podcasts is:

http://[namechanged].wordpress.com

Visit this website to listen to recorded podcasts on this blog site, and also leave comments. Remember during the semester you are required to listen to AND COMMENT ON at least five other summary podcasts. This website is also linked from your course WebCT site.

SUBSCRIBE WITH iTUNES

You can use iTunes to SUBSCRIBE to your course section summary podcast, so iTunes will download new episodes as they are published automatically. iTunes is free software and can be downloaded for Windows or Apple computers from www.apple.com/itunes.

To subscribe to your section's summary podcast channel in iTunes:

1. Visit your section's blog website above.
2. Copy the link in the right sidebar for "Podcast Channel Feed from Gabcast."
3. In iTunes from the ADVANCED menu choose SUBSCRIBE TO PODCAST.
4. Paste the podcast address you copied in step #2 above and click OK.

Now when you click the PODCASTS link in the left sidebar of iTunes, you will see the podcast episodes for your class. Click GET to download episodes. If you have an iPod or iPhone and sync it to your computer, iTunes can transfer/copy the podcasts to your iPod.

E: ANCOVA Assumption Tests

Before conducting an analysis of covariance, two preliminary analyses of the data were conducted to ensure the assumptions of ANCOVA were met. The first procedure was an analysis of variance (ANOVA) on the dependent variable (student grades) and the covariate. The results of this analysis are summarized in Table 11. The observed significance was 0.173 which was not less than 0.05. For this reason, the null hypothesis of no differences among the population means was not rejected and the first ANCOVA assumption was met. This confirms the assumption that a linear relationship exists between the covariate (composite ACT scores) and the dependent variable (student grades).

Table 11

Summary ANOVA for Dependent Variable (ACT Composite as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23.282[a]	2	11.641	6.734	.001
Intercept	7.696	1	7.696	4.452	.036
ACTComposite	19.732	1	19.732	11.415	.001
Group	3.228	1	3.228	1.867	**.173**
Error	611.950	354	1.729		
Total	2607.000	357			
Corrected Total	635.232	356			

[a.] R Squared = .037 (Adjusted R Squared = 0.029)

The second preliminary assumption tested prior to the ANCOVA procedure was a test for the homogeneity-of-regression assumption. The researcher used SPSS to calculate the sum of squares within each group, and adjust those results using the correlation coefficient between the dependent variable (student final grades) and

covariate (composite ACT scores.) Tests of Between-Subject Effects were conducted to determine if significant interaction effects were present. This test was repeated three times:

1. For data including all three semesters (where data from spring 2008 and fall 2008 was combined into a single control group)
2. For data including spring 2008 (a control term) and spring 2009 (the treatment term)
3. For data including fall 2008 (the second control term) and spring 2009 (the treatment term)

Table 12 indicates a significance level of 0.723 for the Group * ACTComposite analysis for all three semesters, which does not fall below the 0.1 significance level. This means significant interaction effects between the dependent variable and covariate are not present for data including all three semesters.

Table 12

Homogeneity-of-Regression Test (All 3 Semesters, ACT Composite as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23.500[a]	3	7.833	4.520	.004
Intercept	3.918	1	3.918	2.261	.134
Group	.042	1	.042	.025	.876
ACTComposite	14.966	1	14.966	8.636	.004
Group*ACTComposite	.218	1	.218	.126	**.723**
Error	611.732	353	1.733		
Total	2607.000	357			
Corrected Total	635.232	356			

[a.] R Squared = .037 (Adjusted R Squared = 0.029)

Table 13 indicates a significance level of 0.471 for the Group * ACTComposite analysis for the Spring 2008 and Spring 2009 semester comparison, which does not fall below the 0.1 significance level. This means significant interaction effects between the dependent variable and covariate are not present for data including Spring 2008 as the control group and Spring 2009 as the treatment group.

Table 13

Homogeneity-of-Regression Test (Spring 2008 and Spring 2009, ACT Composite as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.229[a]	3	3.410	2.003	.115
Intercept	5.199	1	5.199	3.054	.082
Group	.517	1	.517	.304	.582
ACTComposite	8.429	1	8.429	4.951	.027
Group*ACTComposite	.889	1	.889	.522	**.471**
Error	350.728	206	1.703		
Total	1585.000	210			
Corrected Total	360.957	209			

[a.] R Squared = .028 (Adjusted R Squared = 0.014)

Table 14 indicates a significance level of 0.992 for the Group * ACTComposite analysis for the Fall 2008 and Spring 2009 semester comparison, which does not fall below the 0.1 significance level. This means significant interaction effects between the dependent variable and covariate are not present for data including Fall 2008 as the control group and Spring 2009 as the treatment group.

Table 14

Homogeneity-of-Regression Test (Fall 2008 and Spring 2009, ACT Composite as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	22.170	3	7.390	4.288	.006
Intercept	2.039	1	2.039	1.183	.278
Group	.050	1	.050	.029	.865
ACTComposite	16.025	1	16.025	9.299	.003
Group*ACTComposite	.000	1	.000	.000	**.992**
Error	418.762	243	1.723		
Total	1817.000	247			
Corrected Total	440.931	246			

[a.] R Squared = .028 (Adjusted R Squared = 0.014)

By completing these three homogeneity-of-regression tests, as well as the analyses investigating the relationship between the dependent variable (student grades) and the covariate (student composite ACT scores) the researcher affirmatively determined assumptions for ACOVA are met for this initial data set.

As described in Chapter 4, an additional ANCOVA procedure was performed investigating the relationship between the dependent variable (student grades) and student math ACT scores as an alternative covariate. Before conducting this additional analysis of covariance, two preliminary analyses of the data were again conducted to ensure the assumptions of ANCOVA were met. The first procedure was an analysis of variance (ANOVA) on the dependent variable (student grades) without considering the covariate. The results of this analysis are summarized in Table 15. The observed significance was 0.485 which was not less than 0.05. For this reason, the null hypothesis of no differences among the population means was not

rejected and the first ANCOVA assumption was met. This confirms the assumption that a linear relationship exists between the new covariate (ACT math scores) and the dependent variable (student grades) with both control terms combined (N = 257) and analyzed with the treatment term (N = 100).

Table 15

Summary ANOVA for Dependent Variable (ACT Math as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	27.618[a]	3	9.206	5.348	.001
Intercept	6.144	1	6.144	3.570	.060
Treatment	.294	1	.294	.171	.680
ACTMath	19.802	1	19.802	11.504	.001
Treatment * ACTMath	.842	1	.842	.489	**.485**
Error	607.615	353	1.721		
Total	2607.000	357			
Corrected Total	635.232	356			

[a.] R Squared = .043 (Adjusted R Squared = 0.035)

Table 16 indicates a significance level of 0.485 for the Treatment * ACTMath analysis for all three semesters, which does not fall below the 0.1 significance level. This means significant interaction effects between the dependent variable and covariate are not present for data including all three semesters.

Table 16

Homogeneity-of-Regression Test (All 3 Semesters, ACT Math as Covariate)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	27.618[a]	3	9.206	5.348	.001
Intercept	6.144	1	6.144	3.570	.060
Group	.294	1	.294	.171	.680
ACTMath	19.082	1	19.802	11.504	.001
Treatment * ACTMath	.842	1	.842	.489	**.485**
Error	607.615	353	1.721		
Total	2607.000	357			
Corrected Total	635.232	356			

[a.] R Squared = .043 (Adjusted R Squared = 0.035)

By completing this homogeneity-of-regression test as well as the analysis investigating the relationship between the dependent variable (student grades) and the student math ACT scores, the researcher affirmatively determined assumptions for ACOVA are met for this secondary data set using ACT math scores as a covariate.

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