EXPLORING THE RELATIONSHIP BETWEEN MOBILE VIDEO TECHNOLOGY AND UNDERGRADUATE STUDENT SELF-EFFICACY AND MOTIVATION TO LEARN COMPLEX SCIENCE

By

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To my Mom, who encouraged me to keep learning.

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Genetics, and other complex sciences that require complex conceptual thinking, are gaining prominence in American society. Researchers explain that an understanding of science is necessary for "Americans to be competent citizens, workers, and consumers." Unfortunately, the majority of Americans have a poor understanding of genetics and other complex sciences.

Educational researchers suggest improving the public's scientific literacy through better education at the undergraduate level. An obstacle to engaging undergraduates in science is their lack of motivation to learn science. An important component of motivation is self-efficacy, which is individuals' perception of their ability to learn a subject. Researchers explain that incorporating technology into science courses can improve motivation and self-efficacy. Mobile devices are a type of technology that has gained popularity among college students.

The purpose of the study was to explore the relationship between the use of mobile video devices, in particular iPods, and student motivation and self-efficacy in the area of complex science. The participants involved in the study were 14 undergraduate students enrolled in the honors section of an introductory biology course that emphasized genetics. Each participant was given an iPod containing videos focused on genetics. Two focus groups and weekly reflective

journal entries were employed to collect data. Questions addressed participants' perceptions of the use and effectiveness of mobile video devices, their self-efficacy with respect to genetics, and their interest and enjoyment in learning genetics and using mobile video devices.

The participants' believed the main drawback of using iPods was the cost of the devices, and the chief benefit was the "personal" approach to learning. Concerning self-efficacy, the participants believed the videos on the iPods made genetics more accessible, but the content was too basic to improve their understanding of genetics. The participants believed using the iPods was enjoyable, and the incorporation of real life examples into the videos made genetics more interesting.

Teachers interested in using mobile devices in courses should tightly integrate the use of the devices with the learning objectives. The content on the devices should enhance learning outside of class, rather than replace in-class interaction between the teacher and students.

CHAPTER 1
INTRODUCTION

Background

Complex science has become increasingly woven into the fabric of American society. Understanding complex science is no longer optional for citizens in the United States (Bates, 2005). In the 2008 Science and Technology Indicator report, the author explained, “It is increasingly difficult for Americans to be competent as citizens, workers, and consumers without some degree of competence in dealing with science and technology” (Lanzerotti et al., 2006, p. 7-5). but science is constantly evolving. New scientific advances are regularly occurring in the life sciences, especially in the field of genetics. With the completion of the mapping of the human genome and advances in biotechnology and gene therapy, genetics, in particular has become an important field of science for citizens to understandBates, 2005;

Understanding the basic concepts of genetics can influence choices citizens make in their daily lives (Bates, 2005). When purchasing food in a supermarket, individuals are met with a variety of choices that include genetically-modified processed foods (Knight, 2007). Citizens are asked to vote on public policies concerning stem-cell and other genetic research (Nisbet, 2005). The science of genetics can offer a broad range of options to the general public in the area of health care (Lanie et al., 2004). For example, researchers have found that a foundation in genetics concepts can broaden a patient’s decision-making perspective in the area of treatment options and early detection (Lanie et al., 2004).Although science is a part of everyday life, the general public has but a cursory knowledge of it. Studies have found that Americans score consistently high in factual scientific knowledge compared to citizens of other countries (Lanzerotti et al., 2006). Americans had a comparable level of factual knowledge about science

to those living in Europe, and even exceeded the level of scientific knowledge of people in Japan, China, and Russia (Lanzerotti et al., 2006).

While the majority of Americans have superficial factual knowledge of science, including genetics, they often fail to understand the basic scientific concepts and terminology that undergird that information (Bates, 2005; Treise & Weigold, 2002; Paisley, 1998). Researchers have found, for instance, that while many adults include the language of genetics in their everyday conversations, using words like “genes” and “genetics,” few of them understand the concepts they represent (Lanie et al., 2004). Without a firm grasp of the terminology of genetics, people will also struggle with more complex concepts like gene therapy and genetic testing (Lanie et al., 2004). One study explained, “Most Americans (60%) believe they have not eaten genetically-modified foods, although in fact processed foods commonly contain genetically modified ingredients” (Lanzerotti et al., 2006, p. 7-4).

Some of the confusion concerning scientific concepts may originate with the sources of scientific information chosen by the general public. For many adults, their concept of genetics originates from entertainment sources, such as movies, soap operas, advertisements, and magazines rather than educational sources (Nelkin & Lindee, 1995).

The majority of Americans receive information about science from television (Lanzerotti et al., 2006). Unfortunately, scientific information delivered by the mass media has intrinsic weaknesses. In a study of health science news stories, researchers found a barrage of disturbing trends in the news coverage including hyperbole, commercialism, single source stories, baseless predictions from basic science, and little data to back up sensational claims (Schwitzer, 2004).

Researchers have found that scientists question the portrayal of science in the media. In a study of agricultural scientists’ perceptions of national news media coverage of science,

researchers found that news coverage failed in the areas of fairness, balance, trustworthiness, accuracy, and bias (Ruth, Telg, Irani, & Locke, 2004).

With questionable news coverage of science by reporters, the general public needs to have an understanding of complex science concepts to better discern well-supported scientific claims from superficial or questionable ones (Treise & Weigold, 2002). Unfortunately, many adults lack training in complex scien, such as the field ofgenetics. One researcher explained, “The last thorough science training many Americans had was in high school biology” (Lanie et al., 2004, p. 307). Researchers have found that the level of science understanding is associated with both attainment of scientific knowledge and level of education (Lanzerotti et al., 2006).

Science educators have recommended that this lack of public understanding of complex science be addressed with more formal education (Bates, 2005). Researchers have suggested that incorporating more science such as genetics into courses at the undergraduate level might be particularly effective (Bowling et al., 2008). In the United States alone, there are over 16 million undergraduate students (National Center for Education Statistics, 2008). Only about 10% of these students are enrolled in life sciences or health science disciplines that emphasize genetics and science (Bowling et al., 2008). For the other 90% of students, the next level of formal education they experience after high school is through introductory undergraduate biology or genetics courses (Bowling et al., 2008). These courses provide an excellent place to build a foundation and interest in genetics and other types of complex science which may in the long run lead to a better educated public (Bowling et al., 2008).While these introductory courses offer an opportunity to build scientific literacy in undergraduate students, these students may also struggle to stay engaged in the courses. Undergraduates enrolled in introductory science courses tend to be poorly motivated to learn, find science difficult to grasp, and do not see the relevance

of science to their future careers (Glynn, Taasoobshirazi, & Brickman, 2007). This resistance to learning science may be due to the specific vocabulary used to describe genetics. Researchers found in a study of first-year undergraduate students that genetics was listed as one of the most difficult content areas in biology to learn (Bahar, Johnstone, & Hansell, 1999). Researchers have found that learning genetics is similar to learning a new language, with the use of specific terms and definitions (Bahar et al., 1999). Researchers have also found that this area of science requires multilevel thinking at a conceptual level (Johnstone, 1991). One researcher explained, "An organism is at the macro level; cells, chromosomes or DNA are at a micro/sub-micro level; and genotypes are at the symbolic level." (Tsui & Treagust, 2004).

Statement of the Problem

Most undergraduates enroll in non-science majors and their primary formal training in science after high school often comes from required introductory-level science courses (Glynn et al., 2006). Unfortunately, undergraduates tend to lose interest in learning science after taking these introductory science courses (Wright, Sunal, & Day, 2004).

One possible solution may be found in increasing student motivation to learn complex science. Educational researchers have found academic success is impacted strongly by internal forces such as intrinsic motivation (Ryan & Deci, 2000a) and self-efficacy (Bandura, 1986). Increased intrinsic motivation has proven to lead to greater academic achievement including improved performance on standardized tests and more time spent on academic tasks (Patall, Cooper, & Robinson, 2008). Intrinsic motivation has also been linked to greater conceptual learning and memory (Patall et al., 2008).

Undergraduate students currently entering college, born after 1982, are known as Millennials. Millennials, have specific learning styles and characteristics that contribute to the way they learn. Millennials tend to be very ambitious, enjoy learning in groups, desire freedom

in the topics they learn, and enjoy incorporating technology into the learning process (Wilson, 2004; DeBard, 2004; Panettieri, 2007). Using technology in educational settings has proven to benefit such learners. Researchers have found a link between technology use in science courses and increased student motivation, interest, and attendance (Tsui and Treagust, 2004; Dede, Clark, Ketelhut, Nelson, & Bowman, 2005). Incorporating technology into the teaching environment complements the learning preferences of Millennials (Jonas-Dwyer & Pospisil, 2004).

A teaching method that has proven effective with this group of students is incorporating digital media into the classroom. Digital media is considered audio or video material that is available through digital mediums such as the Internet or mobile devices. One example of digital media is a video that can be viewed on a Web site. Researchers have found that including digital media into courses can boost student attitude, attention, motivation, and interest (Pasnik, 2007; Chan, Lee, & McLoughlin, 2006).

Researchers have also found that for science to seem relevant to students, they need to learn broad concepts before they learn detailed information (Hobson, 1999). This works well with educational videos, which often describe a concept in broad terms before offering more detailed information. These broad ideas are many times highlighted in videos with text and graphics, which also support learning (Mayer, Hegerty, Mayer, & Campbell, 2005).

Once effective digital videos have been developed, the mode of delivery must be determined. Using cutting-edge technology to deliver science videos to students may offer some benefits in the area of motivation and self-efficacy. Self-efficacy refers to individuals' perceptions about their ability to complete a specific task (Bembenutty, 2007). In the area of academics, self-efficacy refers to the students' beliefs concerning their competence in a

particular subject, such as science (Ketelhut, 2005). Academic self-efficacy can be influenced by the teaching methods chosen by the instructor. Researchers have found a positive relationship between using technology to teach science and student self-efficacy (Ketelhut, 2005). Researchers have also found a positive relationship between using technology to teach genetics and student motivation (Tsui & Treagust, 2004).

Mobile devices are one type of technology, which may be useful in teaching scientific concepts. Mobile devices are "tool(s) for accessing content, which can be stored locally on the device or can be reached through interconnection" (Trifonova & Ronchetti, 2003, p. 1794). The content contained on mobile devices can include video, audio clips, and images.

Researchers suggest Millennials be taught using technology with which they are comfortable (Dede, 2005). Mobile devices, such as iPods, cellular phones, and MP3 players are part of the culture of undergraduate students. About one in five adults, between the ages of 18 and 28, own an iPod or MP3 player (Ferguson, Greer, & Reardon, 2007). The proliferation of mobile devices is even more pronounced among students. More than 80% of American college students own devices that allow them to download and play recordings (Chan et al., 2006). Mobile devices may offer educators an interesting way to engage their students in course content.

The theory of uses and gratification may offer insight into the fascination many students have with mobile devices, and specifically iPods. This media theory explains that people engage with technology and the media in an attempt to gratify certain needs (Rubin, 2002). Traditionally, uses and gratification theory dealt with the public's use of television and radio, but with advances in technology the theory has been expanded to fit new styles of media.

Researchers have found the public uses these new forms of media, such as the Internet, to meet quite different psychological and social needs (LaRose & Eastin, 2004; Ruggiero, 2000).

Among the variables that researchers have begun to study within these new types of media-rich technologies is the autonomy offered to the user. Individuals viewing media on the Internet, for example, have the autonomy to view videos when they desire and to view only the videos of their choosing (Ruggiero, 2000). In the area of education, understanding why students choose to engage with mobile devices like iPods may offer insight into how to better incorporate these devices into the classroom.

In conclusion, the problem of poor scientific literacy in the area of complex science among Americans may be addressed through education at the undergraduate level. Introductory courses focusing on genetics, biology, and other sciences offer an opportunity to build an understanding of scientific concepts with both science and non-science major students. One key element to engaging this group of students is to increase their motivation to learn complex science. Technology, in the form of mobile devices, may offer a dynamic teaching tool to increase student motivation.

Purpose and Research Questions

In this study, the researcher explored the use of mobile video technology to teach genetics, and its relationship to student motivation and self-efficacy. The study addressed the following research questions:

- **RQ 1:** What are students' perceptions of the use and effectiveness of mobile video devices containing information about genetics in formal education settings?
- **RQ 2:** What are students' perceptions of their self-efficacy with respect to learning genetics in relation to their experience with mobile video devices?

- **RQ 3:** What is the relationship between student interest and enjoyment in learning genetics and the use of mobile video devices?

Significance of the Study

The goal of this study is to better understand the relationship between mobile video technology and student motivation to learn genetics at the undergraduate level. As a result of this study, college professors will gain recommendations on how to best incorporate mobile video devices into their science courses to improve student motivation. Educators will also gain insight into undergraduate learning styles and how mobile video devices align with those learning styles.

In a broader sense, building a strong foundation in science in undergraduate students will also benefit society by increasing the likelihood that these young adults could become informed leaders and policymakers.

Definitions of Terms

- **Complex science:** will be operationally defined as science that includes an intricate terminology (Bahar et al., 1999) and requires multilevel thinking at a conceptual level (Johnstone, 1991). In this study, it will refer to introductory genetics and biology courses at the undergraduate level.

- **Intrinsic motivation:** the "natural inclination toward assimilation, mastery, spontaneous interest, and exploration that is so essential to cognitive and social development and that represents a principal source of enjoyment and vitality throughout life" (Ryan & Deci, 2000b, p. 70). In this study, intrinsic motivation will be the desire a student has to learn complex science.

- **Learning styles:** the different preferences that students have in the way they receive and process information (Felder & Spurlin, 2005). In this study, learning styles will be defined operationally as a preference a student has for learning visually, actively, reflectively, or sequentially (Felder & Spurlin, 2005) and in a particular setting or at a certain time.

- **Millennial students (Millennials):** students born between 1980 and 1994 (Carlson, 2005).

- **Mobile device:** "any device that is small, autonomous and unobtrusive enough to accompany us in every moment in our every-day life…(a) tool for accessing content, which can be stored locally on the device or can be reached through interconnection" (Trifonova & Ronchetti, 2003). In this study, mobile devices will refer to portable devices such as iPods, cellular phones, and personal digital assistants (PDAs) that can contain video and audio clips.

- **Self-efficacy:** the belief a student has that he or she will succeed in learning a particular type of content, such as science (Ketelhut, 2005). In this study, academic self-efficacy will be a student's belief that he or she will succeed in learning complex science concepts.

Limitations

This study faces some limitations in what can be extrapolated from its findings concerning mobile technology in science education settings. The participants in the study consisted of undergraduate students enrolled in an Honors section of an introductory general education biology course that emphasized genetics at a large southeastern university. This course was intended for both non-science and science majors, and therefore, the research findings are not transferable to other groups of students, such as graduate students, or other undergraduate students enrolled in introductory genetics and biology courses. The context was limited to complex scientific concepts in genetics, and therefore, the findings may not be transferable to simple scientific concepts.

The link between the mobile devices and the educational materials they contained offered another limitation. The study focused on both the use of iPods and the viewing of educational videos. If the students enjoyed the videos they may have attributed those positive feelings to mobile technology in general and vice versa, much like the Halo effect, or gaining positive feelings for something and transferring those positive feelings to something else (Ary, Jacobs, Razavieh, & Sorenson, 2006). To combat this effect, questions were asked specifically about

using the mobile device and viewing the educational videos to separate the students' perceptions of each.

Assumptions

An assumption made by the researcher concerns the data collection method used. For both the focus groups and the reflective journal entries, the researcher assumed that the students reported accurately on their attitudes and perceptions toward their experience. The researcher also assumed that the students would be familiar with iPods and have the ability to use them effectively. The researcher tried to address this issue with a student orientation of the iPods at the beginning of the study before leaving the students to their own devices.

Chapter Summary

This chapter discussed the need for improved science literacy of the American public. Complex science, like genetics, has colored the everyday life of citizens, including the food they choose to buy in the supermarket and the health care options they discuss with their doctors. Research has shown that the majority of Americans have only a cursory knowledge of science, which offered little help when they had to make decisions that were grounded in science. Researchers have suggested that the general public needs a better foundation for understanding complex scientific concepts. To that end, science educators have recommended infusing more complex science, like genetics, into introductory undergraduate science courses. This group of courses has offered professors at the university level a challenge because of the diverse group of students enrolled, the majority of whom are non-science majors. A way to address this teaching obstacle is to increase student motivation to learn complex science in these introductory science courses. To that end, researchers have suggested including technology into the teaching environment to increase student involvement with the subject matter.

One form of technology that is gaining prominence with the current generation of undergraduate students entering college is mobile technology in the form of iPods. Using mobile devices, such as iPods, may offer educators an important tool to increase student motivation to learn complex science.

CHAPTER 2
LITERATURE REVIEW

Overview

The purpose of this study was to explore the link between students' perceptions of mobile video technology and undergraduate motivation and self-efficacy in relation to learning complex science. To that end, the use of mobile devices in a science class and the link it has to student motivation and self-efficacy was investigated. Additionally, the way undergraduates use mobile devices in educational settings was examined.

To better understand the conceptual framework supporting this research, the theories of intrinsic motivation, self-efficacy, and uses and gratifications are reviewed. The discussion will then turn to a review of research findings that pertain to the characteristics of the generation of students entering college, known as Millennials, the use of technology in science education, and the emerging phenomenon of mobile devices in educational arenas. Finally, a conceptual model that explains the link between mobile video technology use, the theories described above, and the perceptions of students as they relate to learning complex science and using mobile devices in education will be discussed.

Theoretical Framework

Intrinsic Motivation

Motivation is a concept with strong ties to education. Student motivation to learn has been linked to academic achievement, memory, and learning (Patall et al., 2008; Vansteenkiste, Lens, & Deci, 2006). Motivation as a construct can be described as a person being "moved to do something" (Ryan & Deci, 2000a, p. 54). This concept can be broken down into two parts, extrinsic and intrinsic motivation (Vansteenkiste et al., 2006). Extrinsic motivation speaks to motivation that comes through external rewards, such as approval from a parent or a grade in

school (Ryan & Deci, 2000a). Intrinsic motivation, on the other hand, "represents engagement in an activity for its own sake" (Vansteenkiste et al., 2006, p. 20). Intrinsically motivated activities are activated through internal cues, such as interest or enjoyment in an activity (Ryan & Deci, 2000a). Students that are intrinsically motivated tend to retain information longer, have higher levels of conceptual learning, and spend longer on academic tasks than students that are extrinsically motivated (Vansteenkiste et al., 2006).

The concept of intrinsic motivation originated more than fifty years ago with behavior studies focused on animals (Ryan & Deci, 2000a). Researchers observed animals engaged in activities of play and curiosity that were not prompted by outside rewards but seemingly by enjoyment (White, 1959). This type of motivation was found to act similarly in humans, resulting in spontaneous exploration and learning (Ryan & Deci, 2000a). Researchers explain that this type of motivation is integral to human "cognitive, social, and physical development" (Ryan & Deci, 2000a).

While intrinsic motivation comes from internal cues in an individual, it is activated by external activities. Researchers have stated that an important component of studying intrinsic motivation is identifying characteristics that make an activity interesting (Ryan & Deci, 2000a). Some of the characteristics involved in an intrinsically motivating activity include causation, that individuals believe they have caused the action that led to the positive feelings (Ryan & Deci, 2000a); autonomy, that the person believes he had the freedom to act without outside pressures (Vansteenkiste et al., 2006); choice, the individual believes he can decide between a range of activities or actions (Patall et al., 2008); and self-efficacy, an individual's perceived competence in an area (Ryan & Deci, 2000a), a topic that will be further discussed later in the chapter.

Intrinsic motivation is often measured in two ways, through the "free choice" method or self-reports (Ryan & Deci, 2000a). With the "free choice" method, researchers offer participants a variety of activities and instruct them to use them for a certain period of time (Patall et al., 2008; Ryan & Deci, 2000a). The researchers then leave the participants alone and allow them to choose freely to engage in activities. The length of time they spend in each activity becomes the level of intrinsic motivation the individual has with that activity. An alternative method of testing motivational level is through an individual's self-report of enjoyment or interest with a particular activity (Ryan & Deci, 2000a).

Researchers have studied intrinsic motivation in an effort to determine learning environments that increase or diminish intrinsic motivation (Ryan & Deci, 2000a). Researchers have explained that when considering education "intrinsic motivation will occur only for activities that hold intrinsic interest for an individual – those that have the appeal of novelty, challenge, or aesthetic value for that individual" (Ryan & Deci, 2000a, p. 59). Researchers suggest that educators strive to create learning environments that include activities that activate intrinsic motivation in their students (Vansteenkiste et al., 2000).

Self-efficacy

The concept of self-efficacy is derived from Bandura's social cognitive theory (1977), which states that self-reflection can alter a person's ideas and actions. In the case of self-efficacy, individuals' concept about their own ability as it pertains to a specific task can change the action they take concerning that task (Bembenutty, 2007). With respect to academics, self-efficacy reflects how students perceive their competence in a subject, such as science, or a task, such as conducting a lab technique (Ketelhut, 2005). Students' self-efficacy level can have a major impact on their academic achievement. Research has shown that "self-efficacious students participate more readily, work harder, persist longer, and have fewer adverse emotional reactions

when they encounter difficulties than do those who doubt their capabilities" (Zimmerman, 2000, p. 86). Researchers have found that self-efficacy is closely tied to motivation and levels of performance (Bandura & Locke, 2003).

Individuals' self-efficacy is determined through four major sources; their own performance; watching others perform an action, such as fellow students completing a task; verbal persuasion, through comments from a teacher or parent; and emotional arousal, such as individuals' anxiety level when completing a task (Ketelhut, 2006).

Researchers have attempted to quantify self-efficacy by using two tracks of study: testing self-efficacy through visualization and modeling, and testing through personal experiences of the participant. In the studies focusing on visualization and modeling, participants watch a video or a demonstration of behavior in which they feel low self-efficacy, such as petting an aggressive dog. Videos of positive reactions to the disturbing behavior are then shown, or in some cases, the behavior is modeled in front of them, as a way for the participants to vicariously experience a higher level of self-efficacy. The participants then report on their initial level of self-efficacy concerning the task and how the visualizations have affected that self-efficacy level (Bandura & Locke, 2003). Cervone and Peake (1986) found that individuals that rate their self-efficacy levels to be high tend to persevere longer in difficult or impossible tasks compared to those with lower levels of self-efficacy.

Researchers have also tested self-efficacy by offering participants normative comparisons concerning their performance (Bandura & Locke, 2003). Individuals are given a task and then told their performance was either higher or lower than the average performance (Bandura & Locke, 2003). Even when the normative comparison was bogus, researchers found the performance of participants was affected by the comparison (Bandura & Locke, 2003). Bouffard-

Bouchard (1990) tested self-efficacy levels in students by arbitrarily raising and lowering self-efficacy levels through suggestions that the students were performing higher or lower than their peers on the task. Students that believed they exceeded the performance of their peers "set higher goals for themselves, used more efficient problem-solving strategies, and achieved higher intellectual performances" (Bandura & Locke, 2003, p. 89) than students who had equal cognitive levels but were told that they had performed below their peers. Research has shown self-efficacy to be linked to aspirations, strategic thinking, and problem-solving (Bandura & Locke, 2003).

The dynamics of self-efficacy also translate to individuals working as a team. Prussia and Kinicki (1996) brought together a group to solve a problem. The group was told that its performance was either below or above that of other groups. Groups that held a strong collective efficacy, when faced with poor comparative performance ratings, responded by working harder and eventually produced at a higher level (Bandura & Locke, 2003).

Self-efficacy has also been examined in light of career choice and performance. Research has shown that the higher the level of self-efficacy an individual has with respect to academic performance and perceived job duties, "the wider are the career options people seriously consider pursuing, the greater is the interest they have in them, the better they prepare themselves educationally for different occupational careers, and the greater is their staying power in challenging career pursuits" (Bandura & Locke, 2003, p. 90).

The desire an individual has to work harder in a career also translates into the educational arena. Researchers have found a positive relationship between self-efficacy and student self-monitoring, which includes students' ability to solve problems, persist in difficult tasks, and monitor their work time (Zimmerman, 2000). Wood and Locke (1987) also found educational

benefits linked to self-efficacy level. Higher self-efficacy in undergraduates led to increased academic performance (Wood & Locke, 1987). Researchers have also found a link between academic self-efficacy and undergraduates' perceived career options (Gore, 2006). The higher the level of self-efficacy experienced by a student, the broader the range of careers that were considered viable (Gore, 2006).

Uses and Gratification

As mentioned earlier, an important component of activating student intrinsic motivation and increasing academic self-efficacy in an educational setting is to incorporate activities that are interesting, challenging, and novel to the students (Ryan & Deci, 2000a). Incorporating new technology into the learning environment may be one possible way to offer students an interesting and novel activity. Similar to the concepts of motivation and self-efficacy, the theory of uses and gratification examines individuals' motivation to use new technology, and the needs that are gratified through that use (LaRose & Eastin, 2004). An important component of the uses and gratification theory is the idea that users are active in their engagement with the media. Rubin (2002) explained that the "selection and use of the media, is goal-directed, purposive, and motivated" (p. 527).

Researchers have used this theory to better understand how to deliver effective messages to the public through media sources like television and computers (LaRose & Eastin, 2004). This theory has been particularly effective in determining how the public is using emerging media like the Internet (Ruggiero, 2000). As one author explained, "(the theory of) uses and gratifications has always provided a cutting-edge theoretical approach in the initial states of each new mass communication medium" (Ruggiero, 2000, p. 3). In this study, the theory is used as a conceptual frame to better understand how undergraduates may utilize mobile video technology.

The uses and gratifications perspective originated in the 1940s with researchers that were trying to determine why audience members listened to the radio and read newspapers (Ruggiero, 2000). The focus of the research was to determine what types of gratification individuals experienced when they used a certain type of medium, for example, listening to a radio program to gain new information, be entertained, or learn more about popular culture (Ruggiero, 2000). These early studies had some limitations, including an inability to accurately describe the psychological roots of individual needs and desires (Ruggiero, 2000). As researchers attempted to address these limitations, a shift occurred in their studies, with a focus on more specifically defining the social and psychological factors that generate the needs that are then gratified through media and technology (Ruggiero, 2000).

During the following decades, researchers began to look into factors like race and environment that could color choices made by individuals concerning their use of media. Schramm, Lyle, and Parker (1961) studied how media use in children could be influenced by their interaction with their parents. Gerson (1966) focused on race and discovered a link between media use and racial identity in adolescents. Rather than focusing simply on the gratification that users sought through media, researchers began more fully exploring the phenomenon by including gratifications received, and an examination of user motivation.

Over time, the gratification theory began to crystallize into the theory of uses and gratifications. Katz, Blumler and Gurevitch (1974) described the basic components of the theory as “the social and psychological origins of needs, which generate expectations of the mass media or other sources, which lead to differential patterns of media exploration (or engagement in other activities), resulting in need gratifications and other consequences, perhaps mostly unintended ones” (Katz et al., 1974, p. 20).

Further study of this theory revealed that individuals' media use is influenced by the environment and culture in which they find themselves. Blumler (1979) identified these social influences to include the standards set by the culture, life changes that affect the social structure, and the way in which individuals interact in social settings.

Studies involving the uses and gratifications theory found that individuals' media use is also affected by a number of internal factors, including: level of use of media as background noise, habitual engagement, and expectation for use (Ruggiero, 2000). One important component of the uses and gratifications theory is that "media use is selected and motivated by rational self-awareness of the individual's own needs and an expectation that those needs will be satisfied by particular types of media and content" (Ruggiero, 2000, p. 18). The idea of fulfilling specific needs was tested by Lemish (1985), who found that college students often arrange their schedules to view specific television programming with peer groups. Rubin (1984) found that viewing media in a ritualized form was linked to the enjoyment received by the individual with the medium and a desire for distraction. Researchers have stressed that individuals are looking to media to fill a desire or a group of desires rather than passively being exposed to media (Ruggiero, 2000). Researchers have suggested that future work within the uses and gratification theory be conducted with not simply the media form, but also the media content, and that content plays an important role in media selection (Ruggiero, 2000).

Another component of the uses and gratifications theory is the concept of parasocial interaction. This interaction focuses on the "one-sided interpersonal relationship that television viewers establish with media characters" (Rubin & McHugh, 1987, p. 280). Horton and Wohl (1956) explained that a relationship can occur between audience members and characters on television programs, which develops over time as the audience members view the characters

going through events on the program. This repeated viewing of the characters gives audience members a sense of the "persona" of the character which in turn develops into personal feelings toward that character (Auter, 1992). Much like the study mentioned above with the college students that met together to watch television as a group to meet a social interaction need, parasocial interaction involves building a personal connection with a character in a television program that also meets a need for social interaction.

The concept of surveillance also plays into the theory of uses and gratification. Surveillance is the awareness of the world that audience members have from viewing media which results in a deeper sense of knowledge and security. Often surveillance needs are linked to viewing news programs which offer audience members information concerning current events at a local and worldwide level (Vincent & Basil, 1997). As individuals' surveillance needs increase they tend to consume more media (Vincent & Basil, 1997, p. 387).

The theory of uses and gratifications has become a forerunner in the area of communication research with the advent of the Internet and digital technology (LaRose & Eastin, 2004). "Researchers have been busy applying U&G (uses and gratification) theory to a wide range of newly popularized video media technologies" (Ruggiero, 2000, p. 14). The new styles of media, including the World Wide Web, have led researchers to include additional variables within the uses and gratifications theory beyond gratification desired and obtained and psychological and social needs. The updated uses and gratification theory includes interactivity - how well users can do what they want to do with the technology, asynchronous engagement – the ability to access media and interaction among other users without time constraints, and multimedia - presenting digital video, animations, sound, or text (Ruggiero, 2000). In this study, the concepts of asynchronous engagement with the users and mobile video devices, multimedia

with the use of educational videos loaded onto the mobile video devices, and interaction by describing the way the user interacts with the mobile video devices were explored.

The new variations in media, including the Internet, cellular phones, and mobile devices, have adjusted the media use paradigm of a general message sent to a broad audience and replaced it with a more individualized user that is seeking a specific message and medium (Ruggiero, 2000). Researchers have suggested that the Internet has been an influencing factor in this shift, providing audiences with specialized information that has begun segmenting the population into specialized audience groups (Ruggiero, 2000).

Reviewing the concepts of intrinsic motivation, academic self-efficacy, and uses and gratifications as they pertain to emerging technologies offers a window into the key variables at play in this study. The three theories are composed of variables and components that complement each other. The theory of academic self-efficacy, individuals' perception of their ability to complete a task, is directly related to intrinsic motivation to complete the task. The theory of uses and gratifications within the area of media, such as mobile video technology, is tied to user motivation and interest.

Related Studies

The discussion will now turn to the characteristics of the specific audience in question: undergraduate students known as Millennials. In relation to this group of students, this study offers a discussion of technology use in education with particular attention to the effect of educational technology on student intrinsic motivation, self-efficacy, and the use and gratification received from emerging media sources.

The Millennial Student

Millennial students, born after 1982, are very ambitious and are entering college for bachelor's degrees at record rates (National Center for Education Statistics, 2008). These

students are high achievers, have received high grades in high school, and expect to continue to receive high marks in college (DeBard, 2004). This generation tends to enjoy working in groups and learning in communities (Dede, 2005). Known as "internet-generation learners," Millennials are "seen as more independent, intellectually open, innovative, curious, and self-reliant" than previous generations (Dede, 2005, p. 3). These students have a wide range of activities vying for their attention. Millennials typically have demanding schedules that combine school, work, and extracurricular activities (DeBard, 2004).

Researchers have found that this generation has expectations of its teachers. Millennials want educators to be role models, challenge them, allow them to work with friends, make learning fun, respect them, and be flexible with assignment deadlines (Jonas-Dwyer & Pospisil, 2004). To reach this generation of students, teachers must become "guides on the side" rather than "sages on the stage" (Jones, 2006). No longer are teachers expected to stand in front of the class and lecture to students. Now the role of teachers has transitioned to helping "guide students' enquiry" while being "open and not too restrictive" (Jones, 2006, p. 11).

These students are comfortable with a variety of forms of technology, including cellular phones; PDAs, personal data assistant; and iPods (Dede, 2005). Millennials have an expectation that the use of technology will carry over to the educational arena. Jonas-Dwyer and Pospisil (2004) found that Millennials assume that technology will be used by instructors in the classroom. Wilson (2004) concurred when he found that students expect faculty to use email and online resources in their classrooms. Dede (2005) found that for higher education teachers to be effective, they need to integrate wireless networking and mobile devices into their teaching.

Linked to the concept of integrating technology into the teaching environment is the idea of making the learning experience individualized. Researchers have found that students want a

personalized approach to learning that highlights their interests (Dede, 2005). To that end, this study addresses educational technology use from a personalized perspective that allowed the students to access specific topics within the larger context of genetics research.

Teaching With Technology

A common thread that often appears when discussing effective teaching methods is the use of technology in the classroom. While the form of technology has changed over the years, educational technology use in the classroom continues to have positive effects on student learning (Tsui & Treagust, 2004; Dede et al., 2005; Nelson, Ketelhut, Clarke, Bowman, & Dede, 2005; Frear & Hirschbuhl, 1999; Simon, 2001).

Simon (2001) found in a study of undergraduate students enrolled in a biology course that incorporating a course website featuring an online textbook offered students benefits not provided by traditional printed textbooks. A majority (87%) of students believed that the use of technology did not detract from their learning and would recommend the Web site version of the class to peers (Simon, 2001). Among the advantages of the online textbook were cost savings, (students who accessed the online textbook were not required to purchase a textbook), the ease of use, and not needing to carry a textbook.

The undergraduates in the Simon study (2001) did list some disadvantages to using the online environment. The students found it difficult to try to gain access to computers on campus, experienced Internet delays, were unable to transport the information with them, and found a lack of high quality illustrations on the website as opposed to the textbook (Simon, 2001). In an effort to address these concerns, the researcher of this study incorporated the use of mobile video devices loaded with genetics videos that do not require a computer to access the content, are easily transportable, and incorporate quality graphics.

The positive effects of technology in the classroom often carry over to the use of multimedia. Frear and Hirschbuhl (1999) conducted a study with undergraduates that involved incorporating interactive multimedia into the instruction of biology. The researchers found that undergraduates using educational multimedia in the classroom had an increased level of academic achievement and problem-solving skills (Frear & Hirschbuhl, 1999). The benefits of teaching science with educational technology seem to be useful with students of all ages. Nelson et al. (2005) found similar results using a multi-user virtual environment to teach biology to middle school students. The researchers found that mediating the content through technology offered a variety of benefits to the students, including increased biology knowledge, inquiry skills, and interest in science (Dede et al., 2005). Another effect of using educational technology to teach science was an increased level of academic self-efficacy in the students, particularly with students that were initially performing the lowest compared with their peers (Nelson et al., 2005). The multi-user virtual environment also allowed students to learn through a variety of learning styles (Nelson et al., 2005).

Using technology to teach science has also been shown to be effective in teaching the complex science of genetics. Tsui and Treagust (2004) found that using a computer program with a group of high school students learning genetics improved the students' motivation to learn the material. The high school students in the study enjoyed a variety of benefits from engaging with the computer program, including instant feedback, flexibility (students could go at their own pace through the program), visualization (the incorporation of graphics into the program), and the autonomy they experienced in choosing the path they took through the program (Tsui & Treagust, 2004). Considering these findings, the researcher of this study created an experience

for the students that allowed them to use the mobile video devices at their own pace, with content that included graphics and video and the ability to choose the topics they reviewed.

Teaching With Mobile Technology

With the advent of mobile devices, a new range of technology has opened up for educators. The term “mobile devices” covers an array of technology, including cellular phones, PDAs, MP3 players, and iPods. The unifying characteristics for these devices are that they are small enough in size to be portable, and they allow the user to access the digital materials they contain at will (Trifonova & Ronchetti, 2003). This emerging style of technology is beginning to enter the educational arena (Trifonova & Ronchetti, 2003; McQuillan, 2006; Doolittle, Lusk, Byrd, & Mariano, 2008).

Much like other forms of educational technology, the use of mobile devices to teach science and other disciplines has proven to have positive effects on student academic achievement (Klopfer, Yoon, & Perry, 2005; Trifonova & Ronchetti, 2003). Klopfer et al. (2005) studied the effects of Palm Pilots, pocket-sized computers containing educational games focused on science topics. The researchers found that students who used the Palm Pilots demonstrated increased motivation, engagement in the materials, increased self-directed learning, and enhanced problem-solving skills (Klopfer et al., 2005). In another study by Trifnova and Ronchetti (2003) increased student motivation was again listed as a benefit of using mobile devices in educational settings. The researchers tested mobile devices that contained modules focused on literacy geared toward an audience of young adults in ages ranging from 16 to 24 (Trifnova & Ronchetti, 2003).

Researchers found that certain types of media content work well on portable devices, namely, modules that are short (between five and 10 minutes) and materials that are simple, funny, and functional (Trifonova & Ronchetti, 2003). The researchers also found that the mobile

device should be simple enough to operate without the need of an operating manual (Trifonova & Ronchetti, 2003).

iPods have been gaining popularity in education, because they have the capability of holding a variety of media, including photos, video, and audio clips. iPods have proven to be useful at the collegiate level (Doolittle et al., 2008). In 2005 Duke University created an iPod program that put iPods into the hands of 1,600 first-year students. More than 40 courses incorporated iPods into their curricula (Doolittle et al., 2008). These courses ranged from topics in the social sciences, humanities, engineering, and foreign languages (Doolittle et al., 2008). Researchers found that using iPods offered the following benefits: "convenience of portability, easy digital recording, flexible location, increased student interest and engagement, and enhanced support for individual learning differences" (Doolittle et al., 2008, p. 3).

The benefit of portability has been addressed in other studies (McQuillan, 2006; Doolittle et al., 2008). Researchers have found that other benefits of using iPods in education include differentiated learning, low cost compared with computers, promotion of student creativity and self-expression through some of the iPod authoring features, and independent learning (McQuillan, 2006).

Researchers have also explored the use of iPods in education from the perspective of the instructors. In one study, researchers questioned college professors about their interest and experience with iPods (Murphrey, Miller, & Roberts, 2008). Faculty members were aware of iPods but stated that they were unable to create media clips, video, or audio without additional assistance (Murphrey et al., 2008). The teachers believed that iPods could be used in education, especially as a way to deliver training materials, videos, and lessons for absent students (Murphrey et al., 2008).

Mobile devices, and in particular, iPods have begun to enter the educational arena. Researchers have started to uncover the benefits and challenges of incorporating these devices into the classroom. The current study sought to add to the knowledge base and offer insight into the positive and negative aspects of mobile video technology and its use in the learning environment

The conceptual model (Figure 2-1) shows the flow of ideas explored by this study. The present study used as its catalyst an experience that the participating undergraduates had undergone with mobile video technology. The study investigated how this experience activates students' desire to learn complex science, namely, their intrinsic motivation to learn science, their level of academic self-efficacy as it pertains to complex science concepts, and the manner of use and the gratification received through engagement with the mobile video technology devices. How activation of these three areas impacted students' perceptions of science, genetics, and mobile technology in education was explored. Figure 2-1 consists of the following parts:

1. **The mobile video technology experience**: A personal experience with mobile video technology experienced by undergraduates that allows them to interact independently with iPods over the course of a month.
2. **Uses and gratification**: This theory describes the way individuals engage in technology and media in an attempt to fill certain desires and needs (Rubin, 2002).
3. **Functionality**: The characteristics of mobile devices, its play functionality, as well as the overall appearance.
4. **Perceptions of mobile devices within student culture:** The collective view of using mobile devices within the peer group of undergraduate students.
5. **Gratification**: The benefits perceived by the participants as they use the mobile devices.

6. **Self-efficacy:** This concept describes the belief individuals have that they will succeed in learning a particular type of content, such as science (Ketelhut, 2005). In this study, academic self-efficacy will be an individuals' belief that they will succeed in learning genetics concepts.
7. **Understanding of genetics:** The participants' belief that they grasped the genetics concepts discussed in the science videos shown on the mobile devices.
8. **Perceptions of genetics as accessible:** The participants' perceptions of genetics as a science that relates to everyday life and experience.
9. **Intrinsic motivation**: The "natural inclination toward assimilation, mastery, spontaneous interest, and exploration that is so essential to cognitive and social development and that represents a principal source of enjoyment and vitality throughout life" (Ryan & Deci, 2000b, p. 70). In this study, intrinsic motivation will be the desire of participants to learn genetics.
10. **Autonomy**: The participants' perceptions that they have freedom and choice concerning when they use the mobile devices and which videos they view.
11. **Interest in genetics**: The participants' internal drive to learn genetics.
12. **Enjoyment from mobile devices:** The participants' internal drive to use mobile devices.
13. **Perceptions of science, genetics, and mobile technology in education**: The perceptions and attitudes held by the participants concerning the study of science and genetics. Their interest in learning science and genetics. This also speaks to the attitudes held by the participants concerning the use of mobile technology as a teaching tool in science education.

Conclusion

The theories of intrinsic motivation, academic self-efficacy, and the uses and gratification of media use offer insight into potential ways to activate student learning of complex science

disciplines such as genetics. These theories offer a foundation to better understand student learning with technology. Research findings from the literature indicated that educational technology can, in fact, activate student learning in a variety of ways. The emerging technology of mobile video devices, while not studied as in depth as previous types of educational technologies, may offer many of the same benefits. In conclusion, a visual representation of how the theories of intrinsic motivation, academic self-efficacy, and the uses and gratification of media activate student learning in the area of complex science are shown in Figure 2-1.

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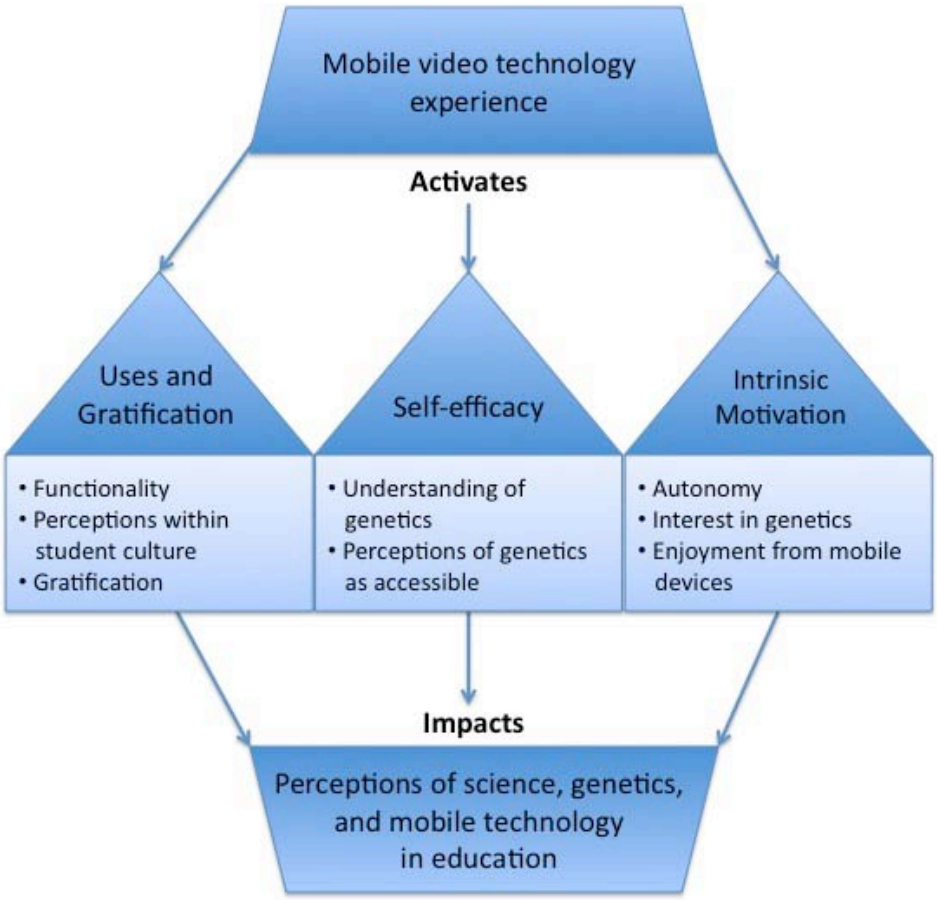

Figure 2-1. Conceptual model of the mobile video technology experience.

CHAPTER 3
METHODOLOGY

Introduction

The general public in America has a poor understanding of the terminology and concepts that are the foundation of complex science (Bates, 2005; Treise & Weigold, 2002; Paisley, 1998; Lanie et al., 2004; Lanzerotti et al., 2006). Researchers have suggested that increasing the exposure undergraduate students have to complex science in their required introductory science courses may lead to a more scientifically literate general public (Bowling et al., 2008; Bates, 2005).

Unfortunately, undergraduates struggle to learn complex science, such as genetics (Glynn et al., 2007; Bahar et al., 1999). To overcome this obstacle in learning, researchers recommend activating the students' intrinsic motivation and academic self-efficacy in the area of science (Glynn et al., 2007). Studies have shown that increasing these factors in students can lead to increased academic achievement, interest in the subject, and persistence in problem-solving (Tsui & Treagust, 2004; Dede et al., 2005; Nelson et al., 2005; Frear & Hirschbuhl, 1999; Simon, 2001).

One teaching strategy that has been proven effective in increasing student intrinsic motivation and academic self-efficacy is incorporating educational technology into classroom settings (Mistler-Jackson & Songer, 2000; Pasnik, 2007; Chan et al., 2006).

In this study, the researcher explored the use of mobile technology, and its relationship to student motivation and self-efficacy. This study took a phenomenological approach in which phenomena are studied through the perceptions of an individual (Groenewald, 2004). The study addressed the following research questions:

- **RQ 1:** What are students' perceptions of the use and effectiveness of mobile video devices containing information about genetics in formal education settings?
- **RQ 2:** What are students' perceptions of their self-efficacy with respect to learning genetics in relation to their experience with mobile video devices?
- **RQ 3:** What is the relationship between student interest and enjoyment in learning genetics and the use of mobile video devices?

To answer these research questions, the researcher designed a qualitative study that collected data through focus groups and reflective journal submissions. The participants in the study were undergraduates enrolled in an introductory genetics course at a southeastern university. The data was collected and analyzed to find themes within the participant responses. The researcher met the issues of credibility, transferability, dependability, and confirmability through a variety of methods including an audit trail, multiple data collection methods, and analyzing the data at two intervals over time.

Study Design

This qualitative study incorporates focus group methodology and textual analysis, to explore students' perceptions of mobile video technology use in learning genetics, and its connection to motivation and self-efficacy. Qualitative research allows researchers to build a more complete picture of an emerging or new phenomenon that has not been fully explored (Morse & Richards, 2002). A benefit of using qualitative methods is that they allow the researcher to gain information about a phenomenon in the context of the subject's natural setting. Qualitative research focuses on "how humans arrange themselves and their settings and how inhabitants of these settings make sense of their surroundings through symbols, rituals, social structures, social roles, and so forth" (Berg, 2001, p. 7). In this study, the researcher was interested in not only the way the participants interacted with the mobile video devices, but also the way the participants perceived their experience in the context of the learning environment.

The study utilized focus groups as the primary form of data collection. Focus groups, as guided group discussions, can generate an understanding of the participants' experience and beliefs (Morgan, 1998). A group of participants are brought together to have a discussion about a certain topic. The moderator facilitates the discussion, and records the perceptions of the participants (Krueger & Casey, 2000).

Krueger and Casey explain that the purpose of a focus group is "to understand how people feel about an issue, product, service, or idea." (Krueger & Casey, 2000, p. 4). The participants have been chosen for the focus group because they share a common characteristic (Krueger & Casey, 2000, p. 4).

These group discussions offer the perspectives of a number of people in one setting and can be more efficient than individual interviews in collecting a broad range of ideas (Ary et al., 2006). Focus groups can be especially useful in studying new topics or ideas because they allow individuals the "freedom to answer in their own words" (Ary et al., 2006, p. 481). Focus groups also allow the researcher to gain a deeper understanding of the motivation and context of the participants' answers (Morgan, 1998). The role of the researcher is to encourage participants to share their perceptions, and respond to the perceptions of fellow focus group participants (Berg, 2001). Focus groups have high face validity because the technique is clear and easily understood by the participants and the results can be presented in a straightforward manner (Morgan & Kreuger, 1998).

Krueger and Casey recommend including 6-8 participants in a focus group for maximum interaction and diversity in viewpoints (Krueger & Casey, 2000). It is also recommended to conduct more than one focus group so that the researcher "can identify trends and patterns"

(Krueger & Casey, 2000, p. 4). In this study, two focus groups were conducted with seven participants in one focus group and six participants in the second focus group.

Morgan and Kreuger (1998) suggest over-recruiting for focus groups to ensure enough attendees. In this study, the entire honors section was solicited for the study to guarantee that at least 12 participants would be available for the two focus groups.

One major strength of this data collection method is that it captures the dynamics or "synergy" in the sample group, which offers a richer picture of the phenomenon than an individual response (Berg, 2001, p. 112). "The resulting synergy allows one participant to draw from another or to brainstorm collectively with other members of the group. A far larger number of ideas, issues, topics, and even solutions to a problem can be generated through group discussion than through individual conversation." (Berg, 2001, p. 112).

The major strength of focus groups can also be the biggest challenge. The group dynamics that can encourage participation among the members of the group can also become a stumbling block as individual members withdraw from the conversation and others dominate the conversation (Basch, 1987). "The inclusion of an extremely dominant participant can produce results that are not reflective of the entire groups' experiences and perspectives." (Vogt, King & King, 2004, p. 234). To combat this, researchers recommend that moderators redirect a conversation that has gotten off track back to the group at large (Vogt et al., 2004). Another tactic is for the moderator to engage withdrawn members by directing questions towards them (Vogt et al., 2004). In this study, the moderator carefully managed the group dynamics within the focus groups to gain the perspective of all of the participants.

Another drawback of focus groups is that the small sample size makes it difficult to make inferences about larger populations (Basch, 1987). To combat this problem, the researcher has

not only conducted a series of focus groups but has also collected data through reflective journaling.

A secondary form of data employed in the study, as mentioned above, were reflective journals. Reflective journals allow, much like focus groups, the ability for the participants to answer questions in their own words and with the brevity or length they choose (Gonzalez & Lengacher, 2007). An advantage of using reflective journaling is that it offers an ongoing account of the participants' perceptions during the experience, but reduces the "possible distortion that can occur when recalling events in retrospect" (Gonzalez & Lengacher, 2007, p. 493).

Another benefit of using reflective journals as a form of data collection is that they involve the subjects as active participants in the study. The participants, much like the researcher, must critically analyze their perceptions of the learning process as they experience it (Shek, Sun, Lam, Lung, & Lo, 2008).

With the use of reflective journal entries and focus groups, the researcher chose methods that gave the participants an active voice to discuss their perceptions toward using mobile video devices to learn complex science. The participants were given the opportunity to discuss in their own words their progression through the experience, offering insight not only into their level of physical use of the devices but also their mindset during the study.

Subject Selection

Participants for the study were recruited from an introductory undergraduate biology course that emphasized genetics, which was offered at a large southeastern university in the fall term of 2007. The undergraduates selected consisted of all the students enrolled in the honors section of the course, which met additionally as a weekly seminar class. A total of 14 students participated in the study. The participant group started with 15 students, but over the course of

the semester one student dropped the class, thus withdrawing from the study. The honors section of the biology course was chosen because it offered a convenient sample. The honors section was also limited to 15 students, which was desirable because the researcher had access to only 15 iPods for the study.

The honors section of the course offered some unique characteristics that may not be typical of the introductory biology course as a whole. The honors students had a high level of scholastic achievement (Table 3-1). The same instructor taught both the introductory biology course, as well as the honors section of the introductory biology course. The instructor included more in-depth discussions and projects in the honors section than she did in the regular course.

There was an even gender split with seven males and seven females among the 14 participants. All 14 participants submitted reflective journal entries, but only 13 participants took part in the two focus groups (Table 3-2). One of the participants was unable to take part in a focus group for scheduling reasons. Participants were at varying educational levels with one freshman, eight sophomores, and five juniors. The participants were enrolled in both science and non-science majors, with five science majors and nine non-science majors. For an overview of the demographics of the participants, see Table 3-1. The Institutional Review Board approved the subject selection, interview protocol, and questioning methods used in the study (See Appendix A).

Instrumentation

The focus group protocol and reflective journal questions were reviewed by a panel of experts consisting of Agricultural Education and Communication Department faculty and the agronomy faculty member teaching the course used in the study.

The questions for the reflective journal submissions were crafted by the researcher, and review and revised by the panel of experts. Each week two - three questions were created that

focused on one of the three research questions. The questions were then emailed by the instructor to the participants in the class at the beginning of each week. The participants would then have a week to reflect on the questions and then email their response back to the instructor. The reflective journal submission included questions like the following: “Describe an application activity that involves mobile learning devices like iPods. Explain how the mobile devices encourage student learning and engagement in the activity.” To view the reflective journal questions offered to the students, see Appendix B.

The panel also reviewed the interview protocol used in the focus groups to ensure the validity and quality of the questioning tools. The word structure and order of the questions were crafted to ensure unbiased responses from the participants. The questions were also developed to be clear and easily understandable by the participants. The focus group protocol is included in Appendix C. During the focus groups, the students also reviewed two science videos on iPods, a handheld mobile video device. This was done as a stimulus to obtain current reactions from the students of the iPods and the videos.

The science videos shown to the participants were developed by the Scientific Thinking and Educational Partnership Program (STEP), a program sponsored by the large southeastern university in which the participants were enrolled. The STEP program focuses on developing multimedia outreach materials that translate research conducted at the university to students, journalists, and the general public.

The STEP team created a series of videos highlighting genetics research conducted at its sponsoring university. The videos featured genetics research conducted in different academic departments, including veterinary medicine, microbiology, and environmental horticulture. Each video was approximately two – three minutes long.

Procedures

On September 24, 2007 the researcher attended the honors section of the introductory biology course and introduced the students to the mobile video technology study. An iPod was given to each student for use during the study. The researcher then reviewed with the students how to use the iPods and access the 17 genetics videos pre-loaded on them. These videos featured science in general and various genetics topics, including genetic markers, the genetics of bees, genetically-modified plants, and the development of vaccines. The researcher instructed the participants that the iPods in their possession could be used to access both entertainment and educational materials outside the scope of the pre-loaded science videos.

The students were instructed to use the iPods to review at least five videos over the next five weeks and answer the weekly reflective journal questions posted by the instructor. Prior to the study, weekly reflective journal questions had been established as part of the curriculum in the course. The professor instructed the students involved in the study to write at least 250 words, or approximately ½ page, for each reflective journal entry. As mentioned earlier, during the study, the instructor emailed the weekly reflective questions to the students and the students emailed back their responses to the instructor. The students received grades for completing each of the reflective journal entries. The transcripts from reflective journal entries can be views in Appendix F-J.

On November 5, 2007, after the completion of the five-week experience with the iPods and educational videos, two focus groups were conducted. The participants signed up for the focus group that best fit their schedule. To ensure the focus groups were conducted in a similar manner, both sessions were conducted using the same focus group questioning guide, in the same room, and within a few hours of each other.

The research in this study was involved in the development of the science videos featured on the iPods. To remove any bias on the part of the researcher during the focus group discussions concerning the videos, a moderator was brought in to facilitate the two focus groups.

Each of the focus group discussions began with an explanation of the purpose of the focus groups and an overview of how the discussion would proceed. To encourage the participants to become comfortable in the focus group setting, the moderator opened the discussion with general introduction questions that focused on technology the participants had experienced in previous undergraduate courses. These questions were meant to encourage discussion among the participants, as well as highlight the experiences the participants shared. The moderator then handed out iPods, and the participants reviewed two videos from the series they were given during their five-week experience. The participants were then questioned about the videos specifically and their use of the iPods to complete their weekly reflective journal assignments. The session concluded with a discussion of the benefits and challenges of using iPods and mobile devices to learn genetics and science at the undergraduate level.

At the end of the sessions, the moderator briefly summarized the main points of the discussion, watched body language for individuals that may be confused or agree with the points, and then offered the participants an opportunity to make corrections or clarify points (Krueger, 1998).

Data Collection

The reflective journal submissions were collected in electronic form as emails, compiled weekly by the instructor, and delivered to the researcher at the completion of the term. The focus groups were videotaped and digitally audio recorded. Each of the focus groups lasted approximately 50 minutes.

During the focus group sessions, the moderator elicited answers from all of the participants, questioning specific individuals that were contributing less than their peers in the group. The moderator also asked questions and went around the group, allowing each participant to answer the question individually to ensure that the perceptions of all participants were obtained. After both focus group sessions were completed, the recordings were transcribed (see Appendix D – E).

Data Analysis

The researcher and the moderator discussed the flow of discussion during the two focus groups, the main themes that emerged, and the different dynamics within each group. The transcripts from the two focus groups and the 64 weekly reflective journal submissions (first week with 14 submissions, second week with 14 submissions, third week with 11 submissions, fourth week with 12 submissions, and fifth week with 13 submissions) were then analyzed using Glaser's (1965) constant comparative method. The constant comparative method begins with transcripts that detail the perceptions of the participants to a phenomenon. The transcripts are then reviewed for emerging themes. As a theme is found, it is kept in a running list. For each additional theme that is discerned, it is compared to the existing themes on the list. If it is found to be different, it is added to the list. After this process is completed, the themes are reviewed. If themes are found to be similar, they are combined to form single themes. In this study, the transcripts were reviewed and themes among the participant responses were compiled.

The free, open-source computer software program Weft QDA was used to record themes and highlight passages in the transcripts and reflective journal submissions that fit within those themes. The Weft QDA program was chosen as the qualitative analysis software tool in this study because it allowed the researcher to identify themes and passages within the transcripts manually. Many other qualitative software tools include an automated system that reviews the

text for key words or phrases. These automated programs require that the researcher enters in a series of key words or phrases, runs the program, and then reviews the results to make sure no errors occurred matching the text with the themes. The Weft QDA program offers a simplified process, allowing the researcher to review the transcripts quickly and identify themes. This program allowed the researcher to compile and adjust the list of themes and associated transcript passages that fit those themes electronically.

The initial data analysis was completed by the researcher on August 23, 2008. The data analysis was then repeated on September 21, 2008 to ensure consistency.

Credibility, Transferability, Dependability, Confirmability, and Reflexivity

In qualitative research credibility, transferability, dependability, confirmability, and reflexivity address the validity of the data collection incorporated in the study and the generalizability of the results. The researcher of this study used these methods of checking validity throughout the study to ensure the results aligned with the original objectives.

Credibility

Credibility is similar to internal validity in quantitative studies. Credibility refers to how accurate and truthful the participants' perceptions are represented by the researcher (Ary et al., 2006). Credibility can be impacted by the research design, choice of participants, and how accurately the researcher records the information received from the participants in context (Ary et al., 2006). To address this concern, the focus group moderator at the completion of the focus groups offered a summary of the main points and asked the participants for clarifications or corrections of those main ideas.

The researcher of this study also discussed the focus groups results with the moderator to better understand the themes that emerged during the sessions and the main points expressed by each group. The researcher also used data triangulation, collecting similar data through multiple

methods (Ary et al., 2006). Two focus groups and reflective journals were used to collect similar data from the participants. To control for bias in the analysis, the researcher conducted negative case sampling by looking for themes that went against expectations. For example, the researcher expected the novelty of the iPods to be a benefit for students learning science. The researcher employed negative case sampling by looking for examples when the students found the novelty of the iPods to be an obstacle in learning science. This technique encouraged the researcher to obtain the full range of subject perceptions without ignoring any concepts (Ary et al., 2006).

Transferability

Transferability is similar to external validity in quantitative studies. Transferability refers to how well the results of the study can be generalized to other groups (Ary et al., 2006). While the goal of qualitative research is not necessarily generalizability of its findings to a larger audience, the researcher has the responsibility to "provide sufficiently rich, detailed, thick descriptions of the context so that potential users can make the necessary comparisons and judgments about similarity and hence transferability" (Ary et al., 2006, p.507). To that end, the researcher has provided a rich description of the context of the experience the participants engaged in during the five-week study. The researchers also viewed the comments given by the participants during the focus group sessions as they related to the larger discussion to ensure that comments were not taken out of context. Ultimately, the goal of the study was for an in-depth understanding of the phenomena within the sample.

Dependability

Dependability refers to the consistency within the study and how well the study could be replicated (Ary et al., 2006). The researcher addressed this by conducting multiple focus groups to strengthen data consistency (Ary et al., 2006).

The researcher also created an audit trail to ensure the consistency of the data analysis over time. The audit trail consisted of the interview protocol, The Institutional Review Board approval form, consent forms from the participants, transcripts from the digital audio and video recordings, transcript passages linked to the themes they represented, and reflective journal submissions. The researcher also used a code-recode strategy which entailed coding the data for themes, leaving the data for a period of time and then recoding the data to see if the same themes emerged (Ary et al., 2006).

Confirmability

Confirmability aligns with objectivity in quantitative studies. Confirmability deals with the issue of neutrality or the lack of bias on the part of the researcher (Ary et al., 2006). To address this, the primary researcher was removed from the role of moderator in the focus groups to ensure that her involvement producing the science videos featured on the iPods did not cloud the group discussion of the videos. In addition, all the findings of the study were peer reviewed by the panel of experts to guarantee the results did not reflect a bias on the part of the researcher. The audit trail which included the focus group questioning protocol; transcripts from the two focus groups; the 64 reflective journal entries; and the Weft QDA files, which detailed the themes and passages that fit within those themes also contributed to the confirmability of the study.

Reflexivity

Within qualitative studies, the researcher becomes an instrument to collect the data (Guba & Lincoln, 1994). The researcher's background, interests, and beliefs can shape the research. The researcher in this study is a graduate student at a southeastern university studying agricultural communication. With a background in distance education, video production, and web design, the researcher is familiar with educational technology. Over the 10 years of working

with faculty to produce videos and online courses, the researcher has shifted in beliefs concerning technology. Originally, the researcher was an advocate for the use of educational technology in the classroom on the basis of its interest to students as something novel. Now, the researcher's ideas focus on using educational technology only in teaching situations where it can enhance the learning of students.

The researcher is also involved with the STEP program, a program that focuses on translating research conducted at its sponsoring university to high school and middle school students. The researcher produced the genetics videos for the study as part of the STEP program. Through involvement with the STEP program, the researcher gained an interest in encouraging students to gain a better understanding of science and potentially enter into a scientific career.

In this study, the researcher has kept previous perceptions concerning educational technology and science education separate from the data collection and analysis to conduct a credible study, allowing the conclusions to arise from the results of the data analysis.

Summary of Methodology

To determine the relationship between the use of mobile video devices and student motivation and self-efficacy, the researcher used focus groups and reflective journals. These forms of data collection were chosen by the researcher to allow the participants to share their perceptions in their own words. The 14 participants in the study were selected from the introductory undergraduate biology course that had an emphasis on genetics. These students were enrolled in the honors section of the course and ranged in college standing from freshman to junior. Each student received an iPod that had been pre-loaded with science videos focusing on genetics topics. The participants were asked to view five videos among a series of 17 videos. The participants watched these videos over the course of five weeks and answered weekly

reflective journal questions about their perceptions of using iPods and educational videos in science education.

At the completion of the five-week experience, the participants were broken into two focus groups to discuss their perceptions of the experience. Each focus group was documented through digital audio recording and videotaping, and these tapes were later transcribed. The researcher reviewed the transcripts and determined themes using Glaser's (1965) constant comparative method.

To ensure credibility, transferability, dependability, confirmability, and reflexivity multiple focus groups were conducted, as well as a secondary form of data collection through reflective journal entries. The researcher also conducted the constant comparative method on two separate occasions to confirm the analysis results. In the end, the analysis results were peer reviewed by a panel of experts to confirm the findings.

Table 3-1. Demographic information of the study participants.

Participant	Male/Female	Year	Major	GPA
1	Male	Sophomore	Economics	3.5
2	Female	Junior	History	4.0
3	Female	Junior	Interdisciplinary Studies	2.6
4	Male	Sophomore	Accounting	4.0
5	Male	Sophomore	Biology	4.0
6	Female	Sophomore	Microbiology	4.0
7	Male	Sophomore	Chemistry	3.8
8	Male	Sophomore	Political Science	4.0
9	Female	Junior	Animal Science	3.8
10	Male	Junior	Civil Engineering	3.9
11	Male	Junior	Economics	3.7
12	Female	Freshman	Biology	3.9
13	Female	Sophomore	Political Science	3.4
14	Female	Sophomore	Accounting	4.0

Table 3-2. Reflective journal submissions and focus group participation.

Participant	Week 1	Week 2	Week 3	Week 4	Week 5	Focus Groups
1	X	X	X	X	X	1
2	X	X	X	X	X	1
3	X	X	X			1
4	X	X	X	X	X	1
5	X	X		X	X	1
6	X	X		X	X	1
7	X	X	X	X	X	1
8	X	X	X	X	X	2
9	X	X		X	X	2
10	X	X	X	X	X	2
11	X	X	X	X	X	2
12	X	X	X	X	X	2
13	X	X	X	X	X	2
14	X	X	X			None
Totals	14	14	11	12	13	13

CHAPTER 4
RESULTS

The purpose of the study was to describe the relationship between the use of mobile video devices and student motivation and self-efficacy in the area of complex science. To achieve this purpose, the focus groups and reflective journal questions addressed 1) participants' perceptions of the use and effectiveness of mobile video devices, 2) participants' perceptions of their self-efficacy with respect to learning genetics, and 3) participants' interest and enjoyment in learning genetics and using mobile video devices. The results are presented in order of the research questions in narrative form. In this chapter, references for participant comments will be listed with a text source description (Group 1 Transcript, Group 2 Transcript, Reflective Journal 10-08-07, etc.) followed by the line numbers in which they appear in the transcripts.

The participants involved in the study were undergraduate students enrolled in the honors section of an introductory biology course that emphasized genetics. The 14 participants came from a range of disciplines and academic levels. In the focus groups there were only 13 participants, one student was unable to make either session due to scheduling issues. The participants were nearly evenly split between men and women. The first focus group included seven participants, including four men and three women. The second focus group included six participants, with three men and three women. The discussion will now turn to the specific results for each of the objectives.

Perceptions of the Use and Effectiveness of Mobile Video Devices

In the discussion of the uses and effectiveness of mobile video devices in science education, three major themes emerged throughout the focus groups and journal entries 1) functionality of mobile devices, 2) perceptions of mobile devices within the undergraduate culture, and 3) gratification experienced through the use of mobile devices.

Functionality

Concerning functionality of the mobile devices, the participants had a predominantly negative view. They stated that the devices were too costly to purchase for educational purposes. The participants explained that the ability to view videos could be replicated by traditional means, through a laptop and projector for in-class viewing or a laptop for out-of-class viewing. One participant explained, “Although the benefits of this method are numerous, there are also some drawbacks, the most obvious being the high expense.” (Reflective Journal 10-8-07, 692-814).

One participant stated that the issue of cost was so prevalent that he was concerned being responsible for the iPod during the course of the study. “Moderator: Any other drawbacks? Student: Cost. I mean $250. I didn't, I mean when you guys offered it to me I didn't want to sign that waiver. I didn't want to be responsible for $250. It's like extra weight.”(Group 2 Transcript, 16003-16363). Another participant explained, “It’s just the cost and the risks and everything, all the bad things outweigh anything good things that would come out of it because the good things are only marginal at best and the costs are very real.” (Group 2 transcript, 37011-37214). Another participant echoed similar sentiments, “On the whole, I felt that any benefits gained from having these iPods was far out weighed by the costs.” (Reflective journal 10-1-07, 336-440).

Another drawback the participants had concerning the use of iPods in educational settings was the small size of the video screen. They believed the screen size would be especially restrictive if students viewed videos containing detailed information. A participant stated,

> Just the size in general. The size of the iPods themselves because the screens are so small it's sometimes difficult to see. Well, for example if a teacher is doing a demonstration it might be difficult to see something like that. So definitely size is a factor. (Group 1 Transcript, 16510-16830)

Another participant explained, “I for one, found that the screen on the iPods were a bit too small and so it's more difficult to look at the videos.” (Group1 transcript, 5826-6029). Some participants mentioned that viewing short videos on the small screen provided by the iPods would be acceptable, but viewing longer videos would be difficult.

One area of functionality with the iPods that the participants enjoyed was the ease of mobility with the device. A participants explained that the iPods were more convenient than traditional educational tools. “(M)ost people don't have an issue carrying a small iPod around as opposed to a heavy textbook.” (Reflective Journal 10-15-07, 6588-6932). Other participants had similar views.

> I think it's beneficial because, just for the fact that you can put it in your pocket, you can watch them (the videos) wherever, whenever but if you have laptop when you doing that you have to haul around a laptop. (Group 1 transcript, 34976-35241)

> The mobile device encourages student learning in that it is learning they can conduct anywhere. They don’t have to be at a desk to do it. They could watch the movie riding home or while eating lunch. (Reflective Journal 10-15-07, 12314-12513)

The issue of mobility, a theme that came up repeatedly throughout the participants’ discussion, will be further explained in the discussion of self-efficacy.

Perceptions within Student Culture

The issue of how iPods and mobile devices were perceived in the undergraduate student culture also emerged through discussion with the participants. The common thread was that the iPods were considered to be a new and exciting type of technology. The participants were very familiar with iPods and the majority of them had either used iPods themselves or had a friend that used an iPod. One participant explained that she had positive feedback from her peers when they found out she was using an iPod in class.

> (S)o many students already have the iPods and they can download these things (podcasts). I know when I was watching some of the videos I was sitting next to one of my friends

> who's not in this field and was like “What are you doing?”, and I showed him some of the videos and he thought it was cool and interesting. (Group 1 Transcript, 22784-23126)

While the “coolness” factor involved in iPods seemed to appeal to the participants, they agreed that non-science majors would probably react more positively to viewing short science videos on an iPod rather than science majors. The consensus was that students with less of a science background would be intrigued by the technology, which would transfer to an increased interest in science and genetics. The technology itself would not have the same effect on those students with more of a science background. The participants explained,

> It definitely will help non-science majors, kind of spark their interest in the field. Maybe not give them too much information but just enough to spark that interest and maybe do some more research into the matter on their own. (Group 1 Transcript, 23432-23663)

> I think it's important for a lot of students, especially kids that aren't maybe science-focused or have those things in mind, to get them involved and show them real-world applications and get them interested. Not necessarily to get them to choose a science major when they get to college but just to get them interested so they'll want to learn more about it. (Group 2 Transcript, 19671-20283)

> I agree for non-science people it might spark an interest there and help them to actually learn the material and maybe pay more attention to it. But I don't know about people who already have that kind of background. (Group 1 Transcript, 23155-23372)

One aspect of the undergraduate culture that the participants agreed would deter the use of iPods in an educational setting was the issue of accountability. Participants repeatedly commented that using an iPod to view videos for class at home would be difficult for a teacher to monitor. Participants believed students would not go home and view the videos on their own. Participants explained that the iPods and video would work best for highly motivated students.

> I would recommend that science teachers only use video iPods and other mobile learning devices if they have a group of relatively self-motivated students. It takes self-discipline and motivation to watch educational videos for a class assignment. Whereas videos in a classroom force students to at least somewhat watch the video. The iPod ones leave it completely up to the students to watch them. (Reflective Journal 10-29-07, 10739-11003)

> I think for the highly motivated students they're effective for having them learn outside the classroom. I mean it's a great starting point if they want to learn more on their own and

> then they can learn it and look it up online or something, get more information. (Group 2 Transcript, 14902-15271)

> I know I wouldn't watch it outside the classroom. I mean there's no reason to. It's just extra stuff. Kids don't even do homework when it counts for a big portion of their grade. They're not going to watch a video iPod. (Group 2 Transcript, 9453-9947)

The idea of students not being responsible enough to watch iPod videos at home was echoed in the next theme of the gratification received through using iPods.

Gratification

The participants mentioned that prior to the study, those that had access to iPods had used the devices for entertainment purposes. Few of them had viewed videos, but for those that had viewed videos they were either episodes of their favorite sitcoms or music videos. The majority of the participants used their iPods to listen to music. The participants mentioned that the idea that iPods are for entertainment rather than education could deter students from using iPods for learning purposes. The participants stated,

> Because the video iPods were first and foremost made for music and entertainment, I think it is very easy for students to forget about the educational aspect of it. Most students would rather listen to music or watch movie clips than scientific video clips. (Reflective Journal 10-8-07, 17407-17665)

> iPods are so personal they would provide an opportunity for many students to try to do something else or just play with the iPod instead of their assignment. Granted this is also true of any focused readings or other personalized assignments which are meant to be done in class but I think that the iPods bring with them a greater temptation to use them for something other than what they are meant for. (Reflective Journal 10-8-07, 3051-3453)

While the participants mentioned that mobile devices had the potential for use in education, they stated that for now they considered iPods to be entertainment devices.

Perceptions of Self-Efficacy With Respect to Learning Genetics

Participants had particular ideas about the use of mobile devices with respect to self-efficacy, or individuals' perceptions about their ability to learn a subject, with respect to science and genetics. Two major themes emerged among the discussion, 1) how the mobile devices

affected their understanding of science and genetics, and 2) how using mobile devices affected their perceptions of science and genetics as accessible, or within their grasp to learn.

Understanding of Genetics

Participants were asked how the iPods affected their understanding of genetics and science in general, as well as how the science videos they viewed on the iPods affected their understanding of genetics and science.

Concerning the use of iPods as learning tools, the participants mentioned that the devices offered a more individualized approach to learning compared with traditional learning avenues, such as lectures, online resources, and textbooks. Participants mentioned that the iPods allowed them to set their own pace for learning. One participant explained, ”(S)tudents are able to learn at their own pace. Instead of being required to learn something by a certain date or having assigned homework, this method allows students to learn at a pace that best suits them.” (Reflective Journal 10-8-07, 269-475). Another participant explained that the device allowed her to “pause it or go back over something I didn't understand or wanted to hear again” (Group 1 Transcript, 7941-8470). This idea of being able to view the material over and over was echoed by another participant,

> Using a mobile device to learn is easy because the learning can take place anywhere, not just in the classroom. Students can also reinforce the material by watching or listening to it as many times as necessary. (Reflective Journal 10-15-07, 2393-2606)

One participant explained that there was a stigma to asking teachers to repeat information in class. ”I think using a mobile learning device like the video iPod really helps students learn the material better. They no longer have to be frustrated or embarrassed when they don’t recall something the teacher said or did” (Reflective Journal 10-15-07, 7430-7883).

Participants also perceived using the iPod to be a “personal” experience. They felt the control they had over the device helped them to focus more on the materials they were learning.

One participant explained, “These devices encourage engagement because they are more personal than watching a video with the rest of the class.” (Reflective Journal 10-15-07, 6588-6932). Other participants explained,

> You’re just in your room and it's just you listening to it. There's no distractions and it's just, it's more like a, I don't want to say personal, but that's the only word I can think of, it's more like a personal experience. (Group 2 Transcript, 8149-8438)

> Students are more apt to pay attention and actually watch the videos when they can do it on their own time and use the technology of a personal video device. (Reflective Journal 10-8-07, 18036-18305)

The participants seemed to choose a time and location to use the devices when they could be focused on the material. A participant stated, “I think I actually paid attention more than I would have in the classroom because there's like no distractions. You can't hear anything else with the headphones. And you're just sitting there staring at it.” (Group 1 Transcript, 10042-10249). Another participant explained,

> The biggest difference was just that you were able to watch it on your own time and like she said I'm more receptive to things like that when I'm relaxed, like lying on the couch with my hot chocolate or laying in bed and a commercial break. When it's on in the classroom sometimes I just came from an exam or I have an exam next period, or I'm in a fight with a friend and my minds not on it, I'm not necessarily going to pay attention. If you have the opportunity to watch it on your own time you're more likely to be in the mindset for it. (Group 2 Transcript, 21423-21982)

For the majority of the participants, they preferred the individual learning experience provided by the iPods compared to traditional methods of learning in a classroom. A minority of participants preferred to view video in class or on a laptop as opposed to an iPod. They stated that using iPods in class could make the environment less personal in the classroom. One participant explained, “One major drawback to using this type of technology in education is that it could possibly result in decreased teacher-student and student-student interaction.” (Reflective Journal 10-8-07, 18759-18924). Those participants found viewing videos on a laptop to be more convenient that on a mobile device. The participants explained,

> It’s just as convenient to watch a video on a laptop or anywhere on campus because there're five or six computer labs on campus. So if I need to watch something it's really convenient to find a computer and watch it on a bigger screen that way. (Group 2 Transcript, 7108-7389)

> I think that whatever message the instructor is trying to convey or whatever lesson the person wants to teach can certainly be done through the Internet. Posting the videos online so the students can watch them at home on their laptops is simply as effective as putting them on iPods. (Group 1 Transcript, 33341-33639)

Some participants believed that viewing the videos in class offered the same benefits as viewing them on mobile devices. A participant explained, “It is a very cool device, but I think showing the video clips on the classroom projector or TV would be more cost effective and would most likely yield the same result.” (Reflective Journal 10-8-07, 17665-17834). Other participants echoed these sentiments,

> I feel that it is not necessary to use mobile devices like the iPods to teach genetics as simply projecting the videos through a computer connected to a projector is just as effective and more cost efficient. (Reflective Journal 10-29-07, 9771-9976)

> I think I'd probably be more receptive to videos in the classroom just because they're longer and they have more information. When it's short I want more except then I'm usually too lazy to go research it on the Internet myself. (Group 2 Transcript, 36252-36744)

> I for one, found that the screen on the iPods were a bit too small and so it's more difficult to look at the videos and it's just difficult because of the screen size. I'd prefer a laptop or if it was being projected on, like in a classroom, a projector because the sizes are a lot larger than them and I can take in the movie. (Group 1 Transcript, 5827-6188)

Participants mentioned the cost factor in their preference of traditional methods over mobile devices. The traditional methods of video delivery, in-class or on a laptop, required no additional cost. One participant explained, “We watched some of these videos in the classroom. I didn't see any difference between watching this in the classroom or watching it on the iPod.” (Group 2 Transcript, 21208-21410). Another participant noted, “If the teacher wants me to watch a video, show it to me in class. That’s why schools have a $1000 projector in each classroom, right?” (Reflective Journal 10-22-07, 6259-6521).

The participants were also questioned about how the science videos they viewed on the iPod affected their understanding of genetics and science. The majority of the participants found the videos to be too short to affect their understanding of science and genetics. The videos ran from one to three minutes in length, and for many participants the short length frustrated them.

> I thought many of the videos were too short to give adequate information. The videos would end just when I thought they were finally moving on from background information to giving actual interesting data that related to the topic. Thus, while I gained a little information in the field of genetics, I felt there was much more that I was not learning. (Reflective Journal 10-1-07, 10069-10427)

> I think that this method does not contribute to student learning as much as it could, simply because the videos were extremely short and seemed to be cut off in the middle. The videos would be more effective if they were longer. (Reflective Journal 10-8-07, 9187-9414)

> The only problem with this video was its brevity. I would have liked it more if it had gone into more detail. Although these videos were very interesting, I thought that most of them were perhaps too short to fully convey enough information regarding genetics. (Reflective Journal 10-1-07, 23992-24254)

The participants believed that the videos would work well as teasers, a way to introduce a topic to the class. They also thought the videos should be used as supplemental materials to support a lecture or readings from a textbook. The participants were concerned that some teachers might rely heavily on iPods and try to replace lecturing to students live in class with the videos. The participants explained,

> Too often some teachers might use videos or stuff like that to actually teach the material but I think using the mobile devices simply as tools to help students further their learning at home or whenever they are outside the classroom is really beneficial. (Group 1 Transcript, 14271-14675)

> My recommendations to science teachers interested in using such devices are that they (iPods) are merely tools to aid them in teaching the subject, but should not be relied upon as the sole source of learning for their students. It is not a substitute for a teacher teaching in front of the classroom and doing activities to help students further understand genetics. (Reflective Journal 10-29-07, 9265-9622)

> Educational videos can really help some students better understand complex subjects like genetics, but it is essential that they not but used as substitutes for actual teaching in the classroom. (Reflective Journal 10-29-07, 10095-10290)

The participants appreciated the visual nature of the videos, which included graphics and pictures to explain concepts and ideas. The majority of the participants identified themselves as "visual learners" and stated that they preferred watching videos to more traditional methods of information delivery. One participant stated, "(M)y learning style is best described as visual. I would much rather watch a short informative video such as on the iPod, than listen to a long lecture." (Reflective Journal 10-22-07, 2770-3118). Another participant explained, "The iPod videos were good for me because I could do little chunks throughout the day, and they worked well with my visual learning preferences." (Reflective Journal 10-22-07, 8230-8375).

Students stated that they preferred the visual media of videos to traditional methods like reading from textbooks. A participant explained, "There are many benefits to using an iPod as an educational device. I found the videos much more interesting than what I might have read in a textbook on the exact same subject." (Reflective Journal 10-8-07, 8508-8617). Another participant stated, "Watching the videos was much more interesting and understandable than reading a textbook." (Reflective journal 10-1-07, 22971-23082).

Some participants also saw the videos as a way to improve the in-class teaching environment. They explained that viewing the videos at home could offer teachers more time to lecture in class. The participants stated,

> I think that the teachers could use the iPods to show a video instead of having to use class time to do that. They could assign that for homework and that would give them more time to actually teach what the video was about or teach information because they wouldn't have to waste that time watching that video in class. (Group 1 Transcript, 15597-15919)

> Teachers would also have more utilizable class time. Instead of being forced to waste thirty minutes, or however long the video lasts, they could assign students to watch the video for homework and use class time to actually explain and teach the concepts. (Reflective Journal 10-8-07, 20688-20948)

> The iPod encourages student learning in that the video does not have to be shown in class time. Therefore, there is more time for the teacher to teach the class instead of the videos. (Reflective Journal 10-15-07, 12124-12308)

A common drawback mentioned to using the videos to teach genetics and science concepts was that they did not allow students to ask questions or interact with the instructor in discussions. The participants explained,

> When you're sitting there watching it you can't ask questions. Your teacher's not right there and the format is too short. I mean it's complex stuff that you're learning. You need to go through it slowly and have someone explaining it so you can ask questions when you need to. (Group 2 Transcript, 12254-12534)

> Using the video iPods removes the personal and human aspects of teaching the subject matter, since when the students are charged with watching the videos, there is usually no discussion period immediately after for the teacher to clarify certain points. (Reflective Journal 10-8-07, 13798-14056)

The participants believed with the intricate nature of genetics, that students needed to learn the content primarily in-class through interaction with their instructor. The participants suggested adding questions to the videos, which would act as prompts for students better engage with the material. A participant explained,

> For teachers wanting to use the iPods or other videos to teach genetics, I would recommend that they make them more interactive with questions throughout the video because it is easy to zone out especially if you are not in a class where someone will make you watch. (Reflective Journal 10-29-07, 1884-2196)

Another participant explained, “I think they should probably have questions that go along with the video to make sure the kids are actually watching them and paying attention when they do.” (Group 1 Transcript, 31302-31459). Participants stated that these questions could facilitate in-class discussions on the materials covered in the videos.

Perceptions of Genetics as Accessible

An interesting theme that emerged through the discussion of the participants was the idea that the videos and the iPods made the scientific content more accessible. This occurred through two ways, using the iPods to view the videos and involving real life examples in the videos.

For some participants, receiving genetics information over a popular technological device like the iPod resulted in positive feelings toward the genetics material. One participant explained, "Presenting the information on iPods makes the information seem much more familiar and approachable, since the students are receiving their education from a common medium that they understand." (Reflective Journal 10-15-07, 4622-4814). Another participant stated, "Students view genetics as a white lab coat and a really strict academic science and not really something that they could relate to, whereas through the video podcasts it makes it more approachable" (Group 1 Transcript, 10721-11137).

Another contributing factor in making the genetics material, and science in general, appear more approachable was the use of examples that related the research to everyday life examples. One participant stated,

> I thought the content was good and that it provided real world examples and real world applications of genetics, not just sitting in a classroom learning that this gene goes this way, you know those kinds of things which are very important, what it's all based on. But it kind of brings it all together when you can watch a video that shows how this is applied to the real world. (Group 2 Transcript, 11219-11600)

This idea of making science more approachable was repeated by other participants. Another participant explained, "By showing students a real-life application in a video, they can have a greater understanding and participate more in class discussions on the topic or help in explaining it to other students or even their friends." (Reflective Journal 10-15-07, 12520-12735). Yet another participant stated, "I liked how they gave real world examples. It helped me to apply what we have learned to the world around me." (Reflective Journal 10-1-07, 21378-

21530). Participants commented that viewing the genetic concepts in relation to their everyday lives made genetics seem like an important field.

Interest and Enjoyment in Learning Genetics and Using Mobile Video Devices

Participants overwhelming said that their experience with the iPods and videos contributed to their intrinsic motivation to learn genetics. This increased motivation could be seen through, 1) an increased autonomy provided by iPods and videos, 2) an increased interest in science and genetics as a result of watching the videos, and 3) an increased feeling of enjoyment from using the iPods.

Autonomy

The most discussed positive feature of the iPods was the autonomy, or independence, offered by the devices. The devices offered choice with respect to location and time that the participants viewed the videos on the iPods. A participant explained, “It allows students to watch and study wherever they want and whenever they want rather than being confined to a certain place and time.” (Group 1 Transcript, 13444-13703). Other participants explained that they had freedom over the videos they viewed and the setting that used to view those videos.

> The videos on the iPods were so short that I just slipped them in whenever I was the most relaxed. I'd watch them during commercial breaks when I was watching TV or when the weather was nice I'd take it outside and lie on the grass and watch them, and that was better for me because it wasn't a rigid desk and seats. (Group 2 Transcript, 10505-10847)

> The iPod had about 20 different videos on it, and I could choose which ones I wanted to view and in class you watch whatever is put on the screen. So that was nice, that I could choose which ones I wanted to view and what order I wanted to view them in. (Group 1 Transcript, 8600-8862)

> Students may be more willing to engage in using the iPods because it’s more fun to scroll through the list of videos and pick one than it is to watch the video that the teacher has pre-selected. With the iPods, each student can customize his or her education. (Reflective Journal 10-15-07, 4988-5248)

A participant explained that the freedom to choose the content "would translate into an increased level of interest on the subject and, as a result, encourage learning to a greater degree than a video that the teacher chooses and has the entire class watch together" (Reflective Journal 10-15-07, 940-1438).

One participant mentioned that the short length of the videos and the freedom to choose what he watched contributed to him gaining a greater breadth of knowledge about genetics.

> The videos on the iPods have influenced my interest in the field of genetics in a positive way. Since the videos were so short, I watched a lot more of them than I would have watched otherwise, and therefore received a broader view of many of the different subfields of genetics. I never really knew that there were so many subfields of genetics, and the videos on the iPods made me more interested in finding out about each of the represented subfields. (Reflective Journal 10-1-07, 13506-13957)

The idea of having freedom and control over their educational experience was repeated by the participants. The iPods offered the participants the ability to learn where they were most comfortable, at a time when they were ready to learn, and about the topics in which they were most interested.

Interest in Genetics

The participants mentioned two features of the videos that added to their overall interest in genetics, namely, the research depicted in the videos included a variety of scientific disciplines and the research was linked to personal areas of interest.

Participants repeatedly mentioned that they were impressed by the diversity of genetics research, that genetics research included areas such as veterinary medicine, anthropology, and horticulture. One participant explained that the videos could give students ideas of where they may work in the future. He explained, "Like someone said earlier, it's more of a 'Hey, look at all the really cool research that you could be involved in if you do the work that you're given in a classroom." (Group 2 Transcript, 20511-20926). Another participant stated,

> Some of the videos might show students how the field of genetics relates to their everyday lives rather than being some obscure branch of science with little practical value. This could cause them to want to find out more about the field and even lead to an interest in genetics related careers. (Reflective journal 10-1-07, 10707-11007)

The participants also mentioned that the videos featured topics they were already interested in such as space travel or history. One participant stated, “I liked the space ones (videos) but that's just because I like space.” (Group 2 Transcript, 32634-32696). Other participants explained,

> The videos definitely piqued my interest in a couple of different specific fields that I didn't know much about before. I was really interested to hear about the FIV/HIV link and the research being done with both viruses to try and find a vaccine, especially because I work at the humane society where we deal with FIV a lot. (Reflective journal 10-1-07, 6119-6449)

> I found the subject matter of the “bees” videos to be entertaining because bees really do have such a huge impact on the agriculture of the world. I found it interesting to see how bees mate, create hives, and produce honey. (Reflective Journal 10-1-07, 3965-4513)

Another participant mentioned that she was “not really a science person” but was a history major. She mentioned that one of the videos featured genetics research involving the history of the Queen of Sheba. The link to a historical figure sparked her interest. She stated that it “kind of made it more interesting for me because it had a more social context than what I 'm used to science being.” (Group 1 Transcript, 11372-11703).

Enjoyment from iPods

Many of the participants mentioned that being able to use iPods was an enjoyable experience. When describing using iPods, participants used words like “cool” and “fun.” One participant explained, “For me it was fun, like as she said as a research thing. It was new. It was cool. When we got it I called my dad, I was like you're not going to believe what we're doing.” (Group 2 Transcript, 37884-38108). Another participant stated, “You can watch it wherever you want, whenever you want, all that stuff. And plus it's just cool. I was excited to have a video

iPod. I thought it was awesome but that's just me." (Group 2 Transcript, 38445-38737). Yet another participant explained,

> The mobile devices are a cool way to get students involved. The students would be more likely to enjoy the lesson because it is coming from a video on an iPod. iPods are very trendy and exciting to most kids, and I think that they would be more interested if they could use an iPod. The attention of the students would be easier kept, and the students would stay more focused and alert. (Reflective Journal 10-15-07, 5868-6258)

The mobile devices were seen as "trendy" and exciting which contributed to the overall experience being enjoyable.

Post-Hoc Analysis

A post-hoc analysis was conducted to determine whether students that were science majors had differing views than non-science major students. The participant group included five science major students and nine non-science major students. In general, the science majors did not feel that the videos had much to offer them. They believed the videos were targeted toward a non-science audience. The science students explained,

> Since I'm already a science person and I know a lot about this kind of stuff it didn't really influence me that much but I can see how using the podcast could captivate non-science (students) into thinking it's more entertaining and stuff like that. (Group 1 Transcript, 12463-12713).

> It was just targeted towards a non-science audience, and I do have a science background so I would have liked more detail from the videos for myself but not necessarily everyone else is like that. (Group 1 Transcript, 13028-13284)

> The videos on the iPods have not really influenced my interest in the field of genetics because I already have a rather strong interest in the area. I could, however, possibly see them inciting interest in students who may not have heard very much about the topic beforehand. (Reflective Journal 10-1-07, 8832-9112).

One science student noted that the videos were interesting because they showed him "how these higher level science topics could be presented in such a way to make them interesting to any uneducated person." (Reflective Journal 10-1-07, 3570-3851).

The science major students seemed to be put off by the basic level in which the information was delivered in the videos. They repeatedly mentioned the "introductory" level of the information in the videos. The science students also complained that they wanted the videos to give more details concerning the science they showcased. The students explained,

> I feel like they are really specific and they definitely explain the specific idea that they were trying to get across very well but in doing so some other ideas that might have been important might have gotten skirted around. For example in the MD (muscular dystrophy) one he just kind of mentioned that it's an expansive protein and you hear that term and you're like "Wait. What is that?" and you might miss the next couple of things he says because it's not really a term he really introduced or said what it was. (Group 2 Transcript, 28005-28863)

> I thought many of the videos were too short to give adequate information. The videos would end just when I thought they were finally moving on from background information to giving actual interesting data that related to the topic. Thus, while I gained a little information in the field of genetics, I felt there was much more that I was not learning. (Reflective Journal 10-1-07, 8233-8832)

> The videos on the iPods were interesting and informative, but they were incredibly short. At the end of each video I would find myself thinking, "It's over already? But they haven't even explained so-and-so yet!" (Reflective Journal 10-1-07, 13016-13411)

The non-science major students on the other hand tended to have a positive outlook on the short, introductory manner of the videos. These students frequently mentioned that the videos made science more accessible and more interesting. The non-science students explained that the videos gave them a new view of genetics as a field they could relate to rather than viewing genetics "as a white lab coat and a really strict academic science" (Group 1 Transcript, 10780-11253). The students stated that incorporating real life examples and a more conversational tone contributed to their enjoyment of the videos. The students explained,

> I liked the form of the video, how it was a scientist talking to you because first of all it felt more personal, like the scientist is explaining this to you and then in addition to that there were cartoon images and things that while they were talking it kind of illustrated what they were talking about. It was easier to visualize. (Group 1 Transcript, 29078-29452).

> The videos have affected my understanding of genetics in a positive way. The videos are short and to the point. I liked how they gave real world examples. It helped me to apply

> what we have learned to the world around me. The videos have heightened my interest in genetics. Again, they made genetics seem more practical to the world around us. I enjoyed watching the videos. (Reflective Journal 10-1-07, 19602-19989)

The non-science major students also mentioned that they found science more interesting after watching the videos on the iPod even though they had a limited interest in science. The students explained,

> I'm not really a science person I guess and so it did make it a little more interesting, you know. And there was one in particular on, one of the videos was titled Queen of Sheba, and being a history major that kind of made it more interesting for me because it had a more social context than what I 'm used to science being. (Group 1 Transcript, 11476-11822)

> I think the little videos increased my interest in genetics in general, because the brevity of the videos left me with so many questions about the information that wasn't fully explained. It prompted me to think more about potential answers to those questions too and made me actually think about science when science has usually been completely uninteresting to me. (Reflective Journal 10-1-07, 2347-2721)

> I watched the videos on scent and the ones on the fat gene. I learned a lot of interesting things that I didn't know and would like to learn more about. (Reflective Journal 10-1-07, 6867-7022)

The consistent theme among the science students was that the videos were too basic concerning the information offered and the videos were better suited to non-science students. The non-science major students believed the videos made science more accessible and sparked an otherwise limited interest in science in them.

Summary

Concerning the uses and gratifications offered by iPods, the participants agreed that the devices were too expensive, and the video screens were too small. They believed iPods were viewed favorably within the undergraduate student culture. Participants stated that students through the iPods were "cool" and "fun." The majority of the participants viewed iPods as entertainment devices rather than educational devices.

The concept of self-efficacy, or how the participants viewed their ability to understand genetics, was also explored. The participants believed that the iPods contributed their learning but that the videos contributed little to the learning. They stated that the iPods offered an individualized approach to learning that allowed them to learn at their own pace, review materials repeatedly, and have a more "personal" experience.

The videos were not viewed as positively. Participants stated that the videos did not have enough content to contribute to their understanding of genetics. The participants also wanted a more interactive experience with the videos. They believed that genetics was too complex a science to learn independently through iPods and videos. The participants wanted to have the opportunity to ask their instructor questions after watching the videos. They also suggested incorporating questions into the videos that could be used to facilitate discussion questions in class.

A positive aspect of the videos was that they made genetics and scientists seem more "approachable" through the use of real life examples and the use of the iPod as the delivery mechanism. Participants believed that using a "trendy" type of technology would translate into a more positive view of the genetics content.

The participants believed that the iPod experience did increase their intrinsic motivation in relation to genetics. The major feature of the devices that added to their intrinsic motivation was the autonomy offered by the device, with the ability to choose where and when they viewed the videos, as well as which videos they viewed. The participants also found the videos to contribute to their interest in genetics by linking the research to outside disciplines like veterinary medicine and history. The videos also featured topics they were already interested in, such as history, space, and animals.

In the posthoc analysis concerning the perceptions of science major students versus non-science major students, in general the science students found the videos to be too basic for them and thought they were geared more toward a non-science audience. The non-science students enjoyed the videos and thought that the videos made genetics more accessible. These students stated that their interest in science was increased as a result of watching the videos.

CHAPTER 5
DISCUSSION

This chapter offers a discussion of the key findings, implications, limitations, conclusions, and recommendations that emerged from the study results. The purpose of this study was to understand the connection between the use of mobile video devices in science education and student motivation and self-efficacy. To achieve this purpose, the focus groups and reflective journal questions addressed 1) participants' perceptions of the use and effectiveness of mobile video devices, 2) participants' perceptions of their self-efficacy with respect to learning genetics, and 3) participants' interest and enjoyment in learning genetics and using mobile video devices.

Key Findings

Perceptions of the Use and Effectiveness of Mobile Video Devices

Study participants discussed the functionality of the iPods, how the devices are viewed in the undergraduate student culture, and the gratification they experienced through the use of these devices. The participants agreed that the biggest drawback to using iPods in education was the price tag. At $250 apiece, iPods were too expensive to purchase for use in classes. They also believed the video screens on the iPods was too small to view educational videos that involved detailed information.

One of the benefits they perceived to using mobile devices was the petite size. The lightweight device offered mobility that was appealing. The participants could easily take the devices with them to a variety of locations, including buses during their commute, their living rooms, and outside on the lawn.

The iPods were described by the participants as "trendy" and "cool." The consensus was that iPods are cutting-edge devices that are popular with undergraduate students. The participants considered using an iPod for class to be an enjoyable experience. When the

participants shared with peers that they were learning genetics through the use of iPods, the participants reported that their peers responded favorably. Participants mentioned that their peers were intrigued by the iPods and the videos the devices contained.

Aligning with the idea that iPods are "fun", the majority of the participants considered the devices to be used predominantly for entertainment purposes rather than educational purposes. Some of the participants stated that the idea that iPods and other mobile devices were made to view entertainment content like music videos and sitcoms rather than educational content could be an obstacle to using these devices in formal education settings. The participants also believed that undergraduate students would not be responsible enough to view educational videos on iPods on their own. Participants suggested that teachers hold students accountable to viewing the videos for class through the use of quiz questions on the materials or an assignment that would link viewing the videos to a grade.

Perceptions of Self-efficacy With Respect to Learning Genetics

The participants agreed that the iPods contributed to the learning experience. The participants explained that the iPods offered them an individualized approach to learning. The participants were able to learn at their own pace, and review videos multiple times if they wished. They also mentioned that viewing videos on the iPods offered a more "personal" experience that presented them with fewer distractions than viewing videos in class or on a laptop.

When considering the videos that the participants viewed on the iPods, on the other hand, they offered mixed reviews. The participants believed while the videos were interesting, they did not offer enough content – at less than three minutes apiece – to provide a greater understanding of genetics. They believed that the videos could be used as an interest approach to introduce new materials in class. The participants were adamant that the videos not replace live

lecture in class. They also believed that the videos could be used as supplemental materials to offer greater depth to a lecture topic. The participants suggested that the videos be longer in length, and contain more genetics concepts. They also recommended that questions be added to the end of the videos, which could then be used as a starting point for a group discussion in class.

Another theme mentioned by the participants was that the videos and iPods made genetics, and science in general, more accessible. Viewing the videos on an iPod, a device the participants considered to be a personal form of technology, made the genetics videos it held seem more personal and applicable to the participants.

The participants also mentioned that real life examples, applying the genetics concepts to everyday issues and situations, contributed to their learning. The participants felt these concepts were within their grasp to learn and that the science of genetics impacted their everyday lives. This concept of genetics as "approachable" also translated over to the scientists conducting the research. As the scientists explained the genetics concepts using common vernacular, the participants became more comfortable with the scientists as well.

Interest and Enjoyment in Learning Genetics and Using Mobile Video Devices

The majority of the participants mentioned that they enjoyed the experience with the iPods for three major reasons, the autonomy provided by the devices, a general interest they experienced for genetics as a result of watching the videos, and enjoyment from using the iPods.

The chief benefit mentioned by the participants in using iPods in education was the freedom to use the devices whenever and wherever they chose. As mentioned earlier, the mobility offered by the devices allowed them to carry the devices to a variety of settings. The short length of the videos also allowed the participants the flexibility to choose a time to watch the videos around other activities. Participants mentioned that learning at what they perceived to be the most opportunistic time contributed to them being in a receptive mood to learn.

This freedom of choice was also important as it related to the content. Offering the participants 17 videos in which they could determine five videos to watch was mentioned as a way for them to have control over their learning experience. The participants wanted freedom to choose what content they learned as well.

The participants mentioned that they were entertained by the mobile device experience. They enjoyed both the videos and viewing the materials on iPods. While the short length of the videos did not seem to contribute to learning, the short length was mentioned as one of the reasons that the videos were so entertaining. The videos piqued the participants' interest. Using iPods also contributed to the enjoyment the participants experienced. The devices, as mentioned earlier, were seen as "cool," which made them more entertaining to use.

Overall, the participants mentioned they had an increased interest in genetics, and enjoyed watching the videos and using the iPods. They also mentioned that the freedom, or autonomy, the devices offered was appealing to them. Interest, enjoyment, and autonomy are all components of intrinsic motivation (Ryan & Deci, 2000a), and therefore it is likely that the participants experienced intrinsic motivation to learn genetics through the iPod experience.

Post-Hoc Analysis

In the post-hoc analysis, science major students perceived the videos to be delivered at a basic or introductory level and stated they wanted more detailed information. The science students believed the videos were geared toward a non-science audience. The non-science major students, on the other hand, believed the videos made genetics more accessible. These students enjoyed the scientists being shown as "real people" and the use of "real life" examples that tied genetics to everyday life.

Implications

Perceptions of the Use and Effectiveness of Mobile Video Devices

The perceptions expressed by the participants concerning the use of iPods seemed to support the uses and gratification theory. The participants mentioned that they were entertained by using the iPods and received enjoyment from the experience. One participant explained, "It's just cool. I was excited to have a video iPod. I thought it was awesome" (Group 2 Transcript, 38445-38737). The uses and gratification theory explains that individuals search out certain types of media and technology to meet certain needs (LaRose and Eastin, 2004).

The participants also seemed to be influenced by their peer group in how they viewed iPods in an educational setting. The participants received positive reinforcement from peers that using iPods was "cool" and "fun." One participant stated,

> iPods are very trendy and exciting to most kids, and I think that they (students) would be more interested if they could use an iPod. The attention of the students would be easier kept, and the students would stay more focused and alert. (Reflective Journal 10-15-07, 5868-6258)

Another participant explained, "In today's society, iPods have become a "trend." Everyone has them, and everyone loves them." (Reflective Journal 10-8-07, 1379-1471). This seemed to contribute to participants' overall perceptions that using iPods was a positive activity. This result supports a finding of Blumler (1979), which states that media use is influenced by individuals' culture.

The participants also found benefits to using the iPods that were more specific to mobile devices, namely being able to have a "personal" experience with the device. One participant explained, "These devices encourage engagement because they are more personal than watching a video with the rest of the class." (Reflective Journal 10-15-07, 6588-6932). This result supports the finding of Ruggiero (2000), which state as new video media technologies become

popular among audiences, a new set of forms of gratification will emerge. This finding also supports the concept of parasocial interaction, which states that viewers can sometimes become personally attached to characters on television programs (Auter, 1992). In this case, the students seemed to have built an affinity with the iPods and the scientists featured in the videos. One participant explained, "I liked the form of the video, how it was a scientist talking to you because first of all it felt more personal, like the scientist is explaining this to you." (Group 1 Transcript, 28747-28909).

Perceptions of Self-efficacy With Respect to Learning Genetics

Students are connoisseurs of learning, especially through technology. Students are constantly exposed to educational materials in both formal settings, such as the classroom, and non-formal settings, such as television. Students believe that education should be both highly entertaining and highly informative. They require a tight connection between the technology used in formal education courses and the course's learning objectives. Students are frustrated when technology is used in the classroom as a quick hook to interest the students, but does not have a clear connection to the learning objectives of the course. One participant summed up his perceptions of iPods as educational tools, "I don't think it's necessarily a good tool for teaching concrete ideas and concepts. It's more of a get you interested sort of thing, like a teaser." (Group 2 Transcript, 20511-20926). This supports the research finding which states that students have high expectations for their teachers when it comes to educational technology (Jonas-Dwyer & Pospisil, 2004; Wilson, 2004).

While students enjoy technology, they do not want the technology to replace live interaction between the teacher and students. One participant stated, "One major drawback to using this type of technology in education is that it could possibly result in decreased teacher-student and student-student interaction." (Reflective Journal 10-8-07, 5733-5894).

These Millennials may be identified by their constant use of technological devices, such as cellular phones and MP3 players (Dede, 2005), but they still want to learn from a live instructor. Participants repeatedly commented that they did not want the iPods to contain lecture materials and other course content that would replace the face-to-face time they spent with their instructor. One participant explained, “Depending on how much you use it, it could make the class less personal like you're just learning from the iPods of your teacher or working with your classmates or things like that.” (Group 1 Transcript, 16882-17064).

It is perhaps the high level of technology-mediated communication that has made live communication so valuable to these students. This supports the research findings that Millennials want a personal approach to be taken in the classroom, with teachers that empathize with their position and try to connect with the students as “people” (Dede, 2005).

The participants enjoyed the autonomy of the iPod experience. They liked the freedom and the choice the device offered. One participant stated, “The video iPods gave me the flexibility to learn where and when I wanted.” (Reflective Journal 10-22-07, 10805-10940). This supports the research finding that Millennial students are “more independent, intellectually open, innovative, curious, and self-reliant” than previous generations (Dede, 2005, p. 3).

The students seem to have conflicting interests. On the one hand they wanted a teacher that is actively involved with their learning, but on the other hand they wanted the freedom to choose what and how they will learned. This incongruity puts teachers in a difficult position, trying to determine how to give students enough choice in the way they learn while at the same time staying involved in the learning process. Jones’ concept of teachers as “guides on the side” rather than “sages in the center” may offer some clarity (Jones, 2006). If teachers act as coaches

rather than lecturers they may be able to guide their students when necessary but still allow the students choice in the way in which they learn.

Interest and Enjoyment in Learning Genetics and Using Mobile Video Devices

The participants were interested in learning genetics when it related to them on a personal level. They enjoyed science when it was conveyed in common language, as opposed to scientific terms. One participant explained, "I like it when the material can relate to my life or if the teacher helps me to relate to it with stories." (Reflective Journal 10-29-07, 12709-12817). Another participant stated, "I did enjoy the videos that gave a more personal view to the research and made the scientists seem more like real people." (Reflective Journal 10-1-07, 5922-6116).

Participants also responded that they became more interested in genetics when they found it related to their interests outside of the classroom such as history, space, and animals. A participant explained, "I found the genetic marker videos to be particularly interesting, in that they related more to history and society. Being a history major, it is easy to understand why those sparked my interest a little more than the other videos. Genetics was placed in a context that I was familiar with and already interested in." (Reflective Journal 10-1-07, 23097-23416). This supports research findings, which state that students want a personalized approach to learning that highlights their interests (Dede, 2005).

The participants also enjoyed using the iPods, and this enjoyment of the technology seemed to transfer over to the content they were viewing on the devices. One participant stated, "Another benefit of using this type of technology is that perhaps it may present educational materials to students in a more entertaining way. Some students may be more apt to pay attention to a video on their iPod than their teacher." (Reflective Journal 10-8-07, 6826-7061). This supports the research findings of Dede et al. (2005) who found that using technology in educational settings can boost individuals' interest in the scientific topics.

The participants also stated a contributing factor to making the videos more interesting was the use of real-life examples that related genetics to their everyday lives. One participant explained, “It is much easier to learn if you can see a real example, rather than using a hypothetical example.” (Reflective Journal 10-29-07, 1240-1422). This finding supports the concept of surveillance. Surveillance is the need for awareness of what’s occurring in the world (Vincent & Basil, 1997). The participants enjoyed seeing how genetics affected their everyday lives, which filled their surveillance need for a broader awareness of what’s happening in the world.

Interest, enjoyment, and autonomy are components involved in intrinsic motivation (Ryan & Deci, 2000a; Vansteenkiste et al., 2006). The participants mentioned that the iPod experience increased their interest in genetics, they experienced enjoyment, and the iPods offered them autonomy. As mentioned earlier, intrinsic motivation includes interest in an activity, enjoyment from an activity, and autonomy within the activity (Ryan & Deci, 2000a). The participants experienced interest, autonomy, and enjoyment during the iPod experience, which may have resulted in increased intrinsic motivation to learn science.

Post-Hoc Analysis

The science major students had a different reaction to the videos compared with the non-science major students. This supports the research findings that Millennial students want an individualized approach to learning (Dede, 2005).

Limitations

The largest limitation of this study is the participant group chosen. Since the participants were drawn from an honors section of an undergraduate biology course, these participants may not reflect the general population of undergraduate students. This is a qualitative study so the

findings are confined to the population of undergraduate students involved in the study, but the findings do provide a better understanding of undergraduate students enrolled in honors courses.

Another limitation is that the context was limited to genetics, and therefore, the findings may not be transferable to other types of scientific concepts. The researcher combated this limitation by asking participants about their perceptions concerning genetics, and science in general.

The link between the mobile devices and the videos offers another limitation. It is hard to determine how these two variables interacted with each other. A participant that enjoyed using an iPod but did not like the video may be influenced to have a positive attitude toward the videos and vice versa. To overcome this limitation, the researcher asked separate questions that related to the participants' perceptions of the iPods versus the videos. These questions were meant to differentiate between the experience with the iPods and the experience with the videos.

Conclusion

The research findings suggest that mobile devices can boost student self-efficacy and motivation to learn science. The results from this study will help guide educators interested in engaging students that are firmly entrenched into the world of mobile technology. The technology offers educational content in a form that is palatable to undergraduate students. With students facing a variety of options for higher education, including online universities, traditional universities, and community colleges, they are looking for the best educational experience for the cost. Mobile technology may offer educators a way to increase student learning in the sciences through increased enjoyment and interest in the educational process.

Recommendations

Practice

The participants offered some suggestions that instructors may want to incorporate to maximize student interest in the educational materials. Instructors should tightly integrate the use of educational videos and mobile videos devices with the course objectives. Teachers should also clearly explain to students how using mobile devices will further their understanding of the course content.

Mobile video devices should be used to enhance the in-class experience, not replace live teacher-student interaction. Students still crave face-to-face interaction with their instructors. Some possible ways to incorporate mobile video devices into classes include interest approaches to introduce new topics, take-home assignments, or make-up work for students that have missed class.

For instructors teaching introductory science courses that include both science and non-science major students, they should relate the scientific concepts to outside disciplines such as history or economics. Non-science major students may be more interested in learning science if they believe the concepts are connected to their interests or outside majors. Educators should also use real world examples to demonstrate the application of science to everyday life. When educators are creating educational videos that will be used on entertainment devices, such as iPods, the videos should have high production value and incorporate graphics as well as music.

When instructors have a course that is predominantly science major students, they may want to incorporate videos that operate as teasers, as well as longer videos that offer more information.

Educators incorporating mobile video devices into the classroom may want to consider that students are influenced by their peers. If a small group of students can be introduced to iPods or

other mobile devices in the classroom, and they have a positive experience, they might in turn positively influence their peers. Students also enjoy using technology that is considered "cool" and "new" by their fellow students. When mobile devices, such as iPods, already have the "cool" factor, they offer teachers a great way to interest students in course materials delivered through the device.

Another factor for educators to consider is that students are interested in learning when they are active participants in the process. They want to choose what they learn and determine the setting and time in which they learn. Mobile video devices offer a high level of control by the users to view content including play functionality that allows them to start, stop, and rewind videos. Using mobile devices in education offer an interesting way for teachers to allow their students to experience autonomy in the learning process.

Future Research

Mobile video devices are only the tip of the iceberg when it comes to emerging technology that could be incorporated into the classroom. From touch panels that allow more freedom in computer usage to holograms that offer 3-D images, technology is constantly evolving. Another interesting aspect of technology is a convergence of functionality. The Apple iTouch is a device that offers Internet connectivity, cell phone functionality, and multimedia capabilities. These types of devices offer educators a whole new range of possibilities. An interesting direction for research would be how teaching methods could adapt to make the most of these new technologies with their wide range of functionality.

The speed with which technology evolves can be daunting for educators that are trying to incorporate current technology into their classrooms. One concept that emerged from this study was that an understanding of how students perceive and use technology can offer teachers valuable information. For example, learning why student go to the Internet can offer teachers

insight into some ways to incorporate the Internet into their classes. Once an understanding of what is motivating students to use technology, instructors will have better tools to integrate technology into their classrooms.

Another interesting aspect of teaching with technology that could be studied in the future is how technology affects how teachers behave in the classroom. The focus of many studies is on how students are affected by technology use in the classroom. Few studies explore how the role of the teacher changes when technology is included in instruction.

Research in the area of educational technology could also be viewed through a different research design. An experimental design study could be crafted that compared students' information retention when they view educational videos in the classroom, through a computer, and on an iPod.

An interesting comment made by one of the students could offer an interesting research project. The student stated that he watched more videos because the videos were short and the iPod was easy to use. In this study, students' interest in genetics was gauged by self-reports. A study could be developed that quantified students' interest in genetics by how many videos they viewed on their own.

The theories of uses and gratification, motivation, and self-efficacy could also be studied as they relate to other types of technology, including online social networking programs, such as Facebook, or virtual environments, such as Second Life.

The differences in introductory science courses between the students that are science majors and those that are not science majors may also offer an interesting area of study. In the post-hoc analysis, students that were science major students seemed to have different expectations of the materials they received than non-science major students. It would be

interesting to delve into this area, and study how science and non-science major students respond to difference science content.

Other possible areas of research that could be explored are studying mobile devices with a variety of audiences, including adults, children, different racial groups, or groups with different socio-economic status. The mobile devices could also be tested in non-formal arenas, such as adult continuing education programs conducted through the Cooperative Extension Service.

Summary of Conclusions, Implications, and Recommendations

In conclusion, the researcher considered the following objectives as part of this study, namely, the uses and gratification of mobile video devices in the area of science education, the relationship between motivation and the use of mobile video devices, and the correlation between self-efficacy and the use of mobile video devices. The participants stated that the benefits they found with using the mobile video devices were the autonomy offered by the devices, and the enjoyment of using "cool" technology. Concerning the drawbacks, the participants listed the cost of the device as the chief deterrent to using these devices for educational purposes.

In the area of motivation and interest in science, participants stated that using the mobile video devices increased their interest in genetics. The content of the science videos also contributed to the increased interest level experienced by the participants. They mentioned that the videos made science and scientists approachable by explaining the scientific concepts in a simple way that included graphics to explain complex processes and ideas. The participants explained that the videos would be especially effective for non-science major students that had a limited foundation in scientific concepts. They also mentioned that the videos related genetics to everyday life through the use of "real world" examples. Another benefit of the videos is that they linked genetics research to outside disciplines such as space and history. The participants

mentioned that when they realized that genetics research was linked to some of their interests, they became more interested in genetics.

Self-efficacy and learning science was also explored in relation to the use of mobile video devices. The participants stated that while their interest was peaked through the use of mobile devices, the videos that the iPods contained were far too short to increase their understanding of genetics. Ultimately, the videos and devices offered little in the way of new information.

When considering the implications of these results, an important item to note is that students view mobile video devices as primarily entertainment devices rather than educational devices. From that point of view, students have certain expectations concerning the devices. Students expect the devices to be simple to use and that the videos they contain will be entertaining and well produced with graphics and music. Educators that create educational videos for non-science major students should explain science in common language rather than scientific language. The videos should ground the science in real world examples and offer links between science and outside disciplines.

Another feature for teachers to consider when using educational technology is that while students enjoy using new types of technology they still are concerned about learning. Students want technology used in the classroom to further the learning objectives of the course and not simply added as a curiosity. Students also do not want technology to replace live interaction with their teacher.

The researcher recommends that educators tie in the use of technology closely to the learning objectives. Instructors should also discuss with their students how the technology will further their learning of the course materials. Videos viewed through mobile devices may be used in the classroom as an interest approach to introduce new topics or to incorporate into take-

home assignments that allow students to delve into the details of a topic in class that they found interesting.

APPENDIX A
INSTITUTIONAL REVIEW BOARD APPROVAL

UF Institutional Review Board
UNIVERSITY of FLORIDA

PO Box 112250
Gainesville, FL 32611-2250
352-392-0433 (Phone)
352-392-9234 (Fax)
irb2@ufl.edu

DATE: October 18, 2007

TO: L. Hightower; T. Irani
PO Box 110540
Campus

FROM: Ira S. Fischler, PhD; Chair
University of Florida
Institutional Review Board

SUBJECT: **Approval of Protocol #2007-U-0978**

TITLE: Student Perceptions of Mobile Device Use in Educational Settings

SPONSOR: None

I am pleased to advise you that the University of Florida Institutional Review Board has recommended approval of this protocol. Based on its review, the UFIRB determined that this research presents no more than minimal risk to participants. Given your protocol, it is essential that you obtain signed documentation of informed consent from each participant. Enclosed is the dated, IRB-approved informed consent to be used when recruiting participants for the research.

> It is essential that each of your participants sign a copy of your approved informed consent that bears the IRB approval stamp and expiration date.

If you wish to make any changes to this protocol, *including the need to increase the number of participants authorized*, you must disclose your plans before you implement them so that the Board can assess their impact on your protocol. In addition, you must report to the Board any unexpected complications that affect your participants.

If you have not completed this protocol by **October 17, 2008**, please telephone our office (392-0433), and we will discuss the renewal process with you. It is important that you keep your Department Chair informed about the status of this research protocol.

1. TITLE OF PROTOCOL: Student Reflection on Mobile Technology Use in Educational Settings

2. PRINCIPAL INVESTIGATOR(s): L. Hightower, STEP Coordinator, Agricultural Education & Communication, PO Box 110540, 2-0502, lisyhigh@ufl.edu, fax – 2-9585; T. Irani, PhD, Associate Professor, Agricultural Education & Communication, PO Box 110540, 2-0502, irani@ufl.edu, fax – 2-9585; M. Gallo, PhD, Associate Professor, Agronomy, PO Box 103610, 273-8124, mgm@ufl.edu, fax – 2-7248.

3. SUPERVISOR (IF PI IS STUDENT): T. Irani, PhD

4. DATES OF PROPOSED PROTOCOL: From 6/01/07 to 6/01/08

5. SOURCE OF FUNDING FOR THE PROTOCOL: Self-funded.

6. SCIENTIFIC PURPOSE OF THE INVESTIGATION: Utilize mobile technologies in educational settings in an undergraduate science classroom. The research element of the project will involve obtaining opinions and perceptions from undergraduate students about the use of technology in classroom instruction.

7. DESCRIBE THE RESEARCH METHODOLOGY IN NON-TECHNICAL LANGUAGE. Two focus groups will be utilized to collect data from participants (10-12 participants in each group). An objective moderator will conduct the focus group sessions from an IRB approved moderator's discussion guide (see attached). The discussion guide will include a set of questions designed to obtain participants' beliefs, attitudes and intent with respect to learning in general, learning in science classroom settings, and learning with technology.

8. POTENTIAL BENEFITS AND ANTICIPATED RISK. No anticipated risks. Potential benefits include valuable feedback from participants for use by the project team in designing, developing, and disseminating educational materials.

9. DESCRIBE HOW PARTICIPANT(S) WILL BE RECRUITED, THE NUMBER AND AGE OF THE PARTICIPANTS, AND PROPOSED COMPENSATION (if any): Participants will be recruited from the Honors section of AGR2332. Approximately 15 undergraduate students will be recruited, with ages ranging from 18 – 25 years. Participants will not be provided any compensation.

10. DESCRIBE THE INFORMED CONSENT PROCESS. INCLUDE A COPY OF THE INFORMED CONSENT DOCUMENT (if applicable). A copy of the informed consent documentation is attached; it will be finalized after the project team has developed the actual format and design of the focus group discussion guide and supporting instrumentation.

_____ _____

Principal Investigator's Signature Principal Investigator's Signature

I approve this protocol for submission to the UFIRB:

_____

Dept. Chair/Center Director Date

APPENDIX B
REFLECTIVE JOURNAL QUESTIONS

Week 1

You've reviewed a series of science education videos on the iPods. Now answer the following questions:

1. What did you think of your experience in general?
2. Have the videos viewed on the iPods affected your understanding of genetics? (Explain your answer.)
3. How have the videos and the iPods influenced your interest in the field of genetics?

Week 2

Consider your experience viewing educational videos on mobile iPod devices. Now answer the following questions:

1. Do you think this delivery method contributed to student learning? Why or why not?
2. What are the drawbacks of using this type of technology in education?
3. What are the benefits of using this type of technology in education?

Week 3

1. Describe an application activity that involves mobile learning devices like iPods.
2. Explain how the mobile devices encourage student learning and engagement in the activity.

Week 4

Different students like to learn in different ways. Consider how you like to learn, including location (library, coffee shop, in a park, at home), time (morning, evening), and style (textbook, video, audio clip, Web site). Now answer the following questions:

- What are your preferences for learning? Consider the location, time, and style.
- How did viewing the videos on iPods work with or against your learning preferences?

Week 5

1. What would be your recommendations to science teachers interested in using mobile learning devices, like iPods, to teach genetics?
2. What would be your recommendations to science teachers interested in using educational videos to teach genetics?

APPENDIX C
FOCUS GROUP PROTOCOL

Participant Informed Consent
Student Perceptions of Mobile Devices Use in Educational Settings

Dear student,

The Department of Agricultural Education and Communication at the University of Florida is engaged in a project to explore student perceptions of the use of mobile devices and video podcasts in educational settings.

As a part of the project we would like to ask students about their beliefs, attitudes and intent with respect to learning in general, learning science, and learning with mobile devices. With your permission, we would like to ask you to participate in this study by sharing your opinions and perceptions as part of a focus group. Focus groups are a form of interview when eight to 10 people discuss a topic and share their opinions. Participation in the focus group study is expected to take about one to one and a half hours. You do not have to answer any question that you do not wish to answer. Results will only be reported in the form of group data; no names will be linked to responses. Participation or non-participation in this study will not affect satisfactory completion of AGR 2332.

Participation in this study is voluntary, and you have the right to withdraw consent of your participation at any time without consequence or penalty. There are no risks or immediate benefits to participants; you will receive no compensation for participating. Your identity will be kept confidential to the extent provided by law. Group results of the study are expected to be available in June 2008 upon request. If you have any questions about this research project, please feel free to contact us at 352-392-0502. Questions about your rights as a research participant may be directed to the UF Institutional Review Board office, University of Florida, PO Box 112250, Gainesville, FL 32611-2250 (352-392-0433).

Sincerely,

Approved by
University of Florida
Institutional Review Board 02
Protocol # 2007-U-0978
Use Through 10/17/2008

Lisa Hightower
Graduate Student

Tracy Irani
Associate Professor

I have read the procedure described above. I _____, voluntarily give my consent to participate in Ms. Hightower, Dr. Irani, and Dr. Gallo's study designed to explore the use of mobile devices and video podcasts in educational settings. Participation is expected to take about one to one and a half hours in a single setting. I have received a copy of this description and voluntarily agree to participate in this study.

_____
Name Date

_____
Principal Investigator Date

Student Reflection on Mobile Technology Use in Educational Settings
Moderator guide and Questioning Route

Moderator reads: Hello and welcome to our session today. Thank your for taking the time to join our discussion about learning in the classroom and mobile technologies. My name is _____ and I am _____ at the University of Florida. Also helping today is _____, also from UF. The University is sponsoring this focus group because they want your feedback about using new mobile media technology to facilitate learning in your classroom.

Before we begin, let me share some things that will make our discussion easier. There are no right or wrong answers, but rather differing points of view. Please feel free to share your point of view even if it differs from what others have said. Please speak up and only one person should talk at a time. We're taping recording and video recording the session because we don't want to miss any of your comments. We'll be on a first-name basis, and in our later reports there will not be any names attached to comments. You may be assured of confidentiality.

My role here is to ask questions and listen. I won't be participating in the conversation, but I want you to feel free to talk with one another. I'll be asking around _____ questions, and I'll be moving the discussion from one question to the next. There is a tendency in these discussions for some people to talk a lot and some people not to say much. But it is important for us to hear from each of you today because you have different experiences. So if one of you is sharing a lot, I may ask you to let others respond. And if you aren't saying much, I may ask for our opinion.

Our session will last about an hour _____. If you have your cell phone or pager and need to leave it on, please leave the room when you get a call and return as quickly as possible. Let's begin. We've placed name cards on the table in front of you to help us remember each other's names.

Let's find out some more about each other by going around the room one at a time. Tell us your name and a little about you, and a hobby you enjoy.

Introductory information

Moderator reads: Today we will discuss your perceptions and feelings about using mobile technologies to facilitate learning in the classroom. I'd like to start by learning more about your educational background.

- What is your major at the University of Florida?
- What year are you at the University of Florida? For example freshman.
- Approximately how many science courses have you taken at the University of Florida?

Perceptions of mobile technology through experiences with iPods

Each of you have been introduced to mobile technology throughout this course. You have used iPods to complete some reflective journal questions and the lesson plan assignment. I'd like to ask you for some of your reactions to this tool.

- What did you think about using an iPod in your course?
- How did viewing educational videos on an iPod affect your understanding of genetics?
- How have the videos and the iPods influenced your interest in the field of genetics?
- Do you think using iPods and other mobile learning technology contributes to student learning? Why or why not?
- What are the benefits of using this type of technology in education?
- What are the drawbacks of using this type of technology in education?

Learning styles and mobile technology

Different students like to learn different ways. Think about the time of day you like to study, the atmosphere you prefer to study in, the style of materials (textbook, video, audio clip, etc.) you prefer.

- What are your preferences for learning?
  - What time of day?
  - What environment? For example in a coffee shop or in your home.
  - What style of materials do you prefer?
- How did viewing the videos on iPods work with or against your learning preferences?

Concluding discussion

We've talked today about using mobile technologies in the classroom:

- What suggestions would you make to professors interested in using mobile technologies like the iPod in their classes?
- What other suggestions do you have?
- Do you have any suggestions or comments we haven't discussed?

I am now going to try to summarize the main points from today's discussions. (key messages and big ideas that developed from the discussion…)

- Is this an adequate summary?

Moderator reads: As was explained at the beginning of the session, the purpose of this focus group was to gather feedback about mobile technologies and learning in the classroom. Your comments today will aid in developing workshops for faculty interested in using technology in their classroom.

- Have we missed anything or are there any other comments?

Moderator reads: Thank you for taking time out of your day to share your opinions. Your participation is greatly appreciated and has provided valuable insight into this topic.

APPENDIX D
FOCUS GROUP 1 TRANSCRIPT

Moderator: Anybody ever done a focus group before? You have? What did you do a focus group for?

P: A lot of stuff. Contacts,commercials.
Moderator: They're often used in market research. So we're doing them a little bit for a different reason today. Good morning. I need you to fill out one of these. You ready. Push that door shut so we can...All right. Well good morning everybody. Thank you very much for being here. We're going to be doing a focus group this morning. It's going to take about an hour and what we're going to try to be doing is to assess your perceptions and experiences using the video iPods in class with Dr. Gallo. So I first have to read you a little script here that talks a little bit about what we're going to be doing and picks up some of the information about the informed consent and then I'll be asking you some questions. So let's go ahead and get started. Welcome to our session. Thank you for taking the time to join our discussion about your perceptions of mobile technologies and their affect on learning. I'm Tracy Irani. I'm an associate professor here at the University of Florida, and also helping me today is Allison Eckhardt who's a grad student in our department. And the University of Florida is sponsoring this focus group because we want your feedback about using mobile devices and video podcasts to facilitate learning. Before we begin let me share a couple of things with you to make our discussion a little easier. A focus group is basically a group interview and I'm going to be moderating it so I'll be asking some questions and kind of facilitating the discussion. I want to encourage everyone to feel free to comment and participate. There are no right or wrong answers, just different points of view. Please feel free to share your view even if your view may be different then others. Please speak up and only one person should speak at a time and I might go around the room and ask each of you to comment at various points of the focus group. We are audio and video recording the session because we don't want to miss any of your comments. We'll be on a first name basis and I'll be asking you your names to begin the focus group. And in our reports on the findings from this focus group your names will not be utilized. We'll be getting transcripts that will based on the recordings and the recordings will be destroyed. My role here is to ask questions and listen. I won't be participating in the conversation but I want you to feel free to talk with each other. I will be asking about 20 questions, and I'll be moving the discussion from one question to the next. It's important to hear each of you because you've got different experiences so again I'm going to encourage you all to comment. And if I feel... I would like to get everyone to comment as I said I might go around the room and get each of you to comment. Our session will be about an hour and if you have a cell phone or a pager please turn those off. And what I'd also like to do is to ask you also, when I ask the first question, tell me your name as you begin to respond. All right. So let's go ahead and begin. So today we're going to be discussing perceptions and feelings about using mobile devices to facilitate learning in the classroom. I'd like to start by learning more about your previous experience with mobile devices. So I want to start over here with you and I want you to tell me your name and then also tell me what your major is and I would like you to answer the question, consider the mobile device like the iPod that we're going to be talking about today also MP3 players or cell phones, and 'Do you watch video on any of these mobile devices?.'

Non-science P1: Ok my name is (removed). I am a second-year economics major. My feelings on the mobile devices, personally I rarely use my mobile device to watch videos. I typically do that either through my laptop or TV at home. So I don't really use it as a tool for watching videos.

Moderator: Ok great. And you are?

Non-science P2: I'm (removed). I'm a second-year history major, and I've never really used an iPod or anything like that before for video. It's mostly been for music and when I do watch videos, same as (removed), it's usually on the laptop or just on a TV.

Moderator: Ok great.

Non-science P3: (removed), third-year biology major. I have watched videos on iPods before but I don't normally. Just use it for music.

Moderator: Hmm-hmm. Ok.

Non-science P4: I'm (removed). I'm a first-year accounting major and I usually watch videos on TV or a computer. Not usually an iPod. I use that for music.

Moderator: Ok.

Science P5: I'm (removed). First-year biological engineering major. I have an iPod but like most other people I don't really use it for educational movies and stuff, mostly just a laptop.

Moderator: Ok.

Science P6: (removed). First-year microbiology major and I don't really use iPods to watch videos, mostly laptops and TV.

Moderator: Ok, and finally.

Science P7: My name is (removed), and I'm a second-year microbiology major. And I never had an iPod so I never got the chance to watch videos on them. I probably would have if I had the chance. I always watched, if I watched them I would watch lectures on my laptop, which is all I ever did.

Moderator: Ok. Great. Now most of you have not, either have not used iPods before or don't watch videos on your iPods. Can I ask those of you that have listened to music on iPods, why don't you watch video on your iPods?

Non-science P2: Normally when I, I'll listen to music while I'm studying or doing homework so I can't really be watching both you know. I can't look at my notes and be watching video at the same time. (7:18)

Moderator: Ok.

Non-science P2: So I normally use it as background noise.

Moderator: Ok. Anybody else?

Non-science P1: I for one, found that the screen on the iPods were a bit too small and so it's more difficult to you know look at the videos and kind of look at them and it's just difficult because of the screen size. I'd prefer a laptop or if it was being projected on like in a classroom, a projector because the sizes are a lot larger than them and I can take in the movie.

Moderator: Ok. Anyone else who watches videos on a laptop or other kinds of device, do you have any other perceptions about that?

Science P7: When you watch videos on an iPod, how long is the battery? Because I've thought that if you watch videos on there then it runs the battery down faster. Do you know?

Moderator: It's a couple of hours but I'm not sure. Yeah.

Science P7: So that's a reason why I might possibly not watch it. (8:24)

Moderator: Ok. Now all of you said that even though you might not watch video on an iPod, you do watch videos either on a laptop or a tv or a computer. When you watch video do you watch primarily for education or entertainment or both? So when watching you're watching videos at all what do you primarily watch them for? Let me start over here. Go ahead.

Non-science P3: Mostly entertainment.

Moderator: Mostly entertainment. Ok, ok.

Science P7: The occasional lecture, but...

Moderator: Ok. How many of you watch for entertainment? That's everybody. Ok. Any of you watch for educational videos?

Science P7: I watch educational.

Moderator: Ok. What kinds?

Science P7: Lectures for online classes pretty much most of it. And I have done some science, just on my own, just things I was interested in to learn more about certain topic.

Moderator: So you went to a web site.

Science P7: Yeah, like that.

Moderator: All right, anybody else?

Science P6: Statistic lectures online.

Moderator: Ok. Lectures, yes.

Non-science P7: Online lectures.

Moderator: Ok, anybody else with a different experience? In addition to (removed), how many of you have ever downloaded or gone to a Web site and downloaded a video to watch? Ok, that's a few of you, three of you. Ok. All right. Now let's talk specifically about your experience in Dr. Gallo's class. Each of you have your video podcasts on an iPod to complete some reflective journal questions and the lesson plan assignment in Dr. Gallo's class. So now I'd like to ask you reactions to this tool. How do your experiences with viewing the video on an iPod compare to watching videos in a classroom setting? (10:18) What did you think about it as compared to watching a video in class?

Non-science P3: I liked it better in some ways that I could like pause it or go back over something I didn't understand or wanted to hear again.

Moderator: Ok. All right, so you were able to go back and hear it again. Ok. Anybody else with some perceptions.

Science P7: Yeah. We got, the iPod had about 20 different videos on it, and I could choose which ones I wanted to view and in class you watch whatever is put on the screen. So that was nice, that I could choose which ones I wanted to view and what order I wanted to view them in.

Moderator: So you had choice and you could determine when you saw things. Anybody else with any thoughts about how this experience went for you as opposed to watching videos in a classroom?

Non-science P1: For me, watching the videos on the iPod itself was more of, kind of like, it seemed like an entertainment type of, of viewing it as some sort of entertainment. Whereas in class when it is more of a classroom setting, I have that kind of academic mindset. Whereas if I'm viewing it at home or wherever I am on the iPod it seems like I'm just watching it for pleasure.

Science P7: For leisure.

Non-science P1: For leisure. Yeah right.

Moderator: Ok. Anybody else feel that way?

Science P7: I felt that way because I could watch it wherever I wanted. I was more comfortable when I was using it. I could sit on my couch and just it in my hand. That's how it was more leisurable for me.

Moderator: Ok.

Science P7: Just how I felt.

Moderator: All right. Anybody else have any thoughts about their experience with the iPods?

Non-science P2: I felt about the same with the you know, with more leisurely and more comfortable. It's just wherever you want to be when you watch it.

Non-science P3: I think I actually paid attention more than I would have in the classroom because there's like no distractions. You can't hear anything else with the headphones. And you're just sitting there staring at it.

Moderator: So for you it helped you pay attention more.

Non-science P3: Yeah, because in class everyone you know falls asleep, put their head down, do your homework.

Moderator: Yeah. Ok. Consider the topics that were discussed on the video iPods podcasts. Did watching these videos, how did that affect your ideas about genetics? What did you think of the content? Did it influence your thoughts about genetics in any way?

Non-science P1: This really made it more of a fun topic. I guess I'm not alone in this but a lot of high school students or younger students view genetics as a white lab coat and a really strict academic science and really, not really something that they could relate to. Whereas through the video podcasts it makes it more approachable. And I feel like the students, and students including myself feel that it's as easier topic to grasp then before watching the videos.

Moderator: Let's go around the room and follow up on that. And I'm sorry I'm not able to remember your names so if you want to say your name again that will help me a little bit. So what did you think about the content?

Non-science P2: I'm not really a science person I guess and so it did make it a little more interesting, you know. And there was one in particular on, one of the videos was titled Queen of Sheba, and like being a history major that kind of made it more interesting for me because it had a more social context than what I 'm used to science being.

Moderator: Ok.

Non-science P2: So yeah.

Moderator: So that was something you could relate to?

Non-science P2: Yeah, exactly.

Moderator: Ok. All right, and?

Non-science P3: Well since I'm a bio major like I know, I already know a lot about this stuff but it was basically just entertaining for me to see like all the different possibilities and places that we're going with genetics.

Moderator: Ok.

Non-science P4: I think it increased my interest in a lot of things that I didn't really know about. A lot of them were too short to really teach anything major but it made me more interested in some of the stuff.

Moderator: Ok.

Science P5: Since I'm already a science person and I know a lot about this kind of stuff it didn't really influence me that much but I can see how using the podcast could captivate non-science into thinking it's more entertaining and stuff like that.

Moderator: Ok. (15:00)

Science P6: Yeah. I thought a lot of them were kind of really short and they didn't really give a lot of information but maybe if you didn't know a whole lot to begin with then they could kind of make you more interested and make you want to learn more about that.

Moderator: All right.

Science P7: I pretty much agree with everyone else. It was just targeted towards a non-science audience, and I do have a science background so I kind of would have liked more detail from the videos for myself but not necessarily everyone else is like that.

Moderator: Ok. So you all are sort of in general are thinking this is for a non-science audience essentially. Ok. Do you think that the iPods and other mobile devices, focusing on the technology here for a minute, do you think that can contribute to student learning? Are you saying 'Yes.'?

Science P5: Well, I think the main benefit would be having if you could somehow videotape all the lectures in class and put them on podcasts it allows students to watch and study wherever they want and whenever they want rather than being confined to a certain place and time.

Moderator: Ok. So you think that having the convenience of that could contribute to student learning. Anybody else have any thoughts about whether iPods and mobile devices can contribute to student learning? Do you think it would help you learn?

Non-science P3: I think if you use videos as like supplemental material, to teach something in class and then maybe give them a homework video to watch that further explains it or shows the application of what they learned to the real world.

Moderator: Ok. So as supplemental material? Anybody else.

Non-science P1: Yeah, I agree. I think the mobile devices should certainly only be used as a supplementary tool and should not be a substitute for any teaching in the classroom. To often some teachers might use videos or stuff like that to actually teach the material but I think using the mobile devices simply as tools to help students further their learning at home or whenever they are outside the classroom is really beneficial.

Moderator: Ok. All right.

Science P7: Can I say something?

Moderator: Sure.

Science P7: I just think that if you film all, let's say they're filming all the lectures in class and then putting them on the iPod and you can watch them at home I don't think that is a good idea because then these

students will not be paying attention in class because they know that they can just watch it on their iPod. I think that if it's going to contain anything from the class it should probably...let's say they watch a video in class it would be good to put the videos on the iPod and then they could watch them again if they would like to or if there's a demonstration they want to watch again but not necessarily lecture by the teacher. I don't think that should, that should go down in the students' notes not in the iPod.

Moderator: Ok. Anybody else, what do you think about that? Do you agree with that or disagree?

Science P6: I think that the teachers could use the iPods to show a video instead of having to use class time to do that. They could assign that for homework and that would give them more time to actually teach what the video was about or teach information because they wouldn't have to waste that time watching that video in class.

Moderator: Ok. All right. Are there any drawbacks to using mobile devices like this. I know (removed), you mentioned one which is that maybe students wouldn't pay attention if they thought they were getting the content already. Are there any other drawbacks that you can see in using this kind of a tool in classes?

Non-science P3: Probably cost. I mean they're really expensive and a lot of students aren't responsible. And either they end up having to pay for it, they lose it or break it.

Moderator: Ok. Cost would definitely be a factor. Any other drawbacks to this kind of a tool?

Non-science P1: Just the size in general. The size of the iPods themselves because the screens are so small it's sometimes difficult to see. Well, for example if a teacher is doing a demonstration it might be difficult to see exactly what they're doing if the camera is for away or something like that. So definitely size is a factor.

Moderator: Ok. And you were going to say?

Non-science P4: Depending on how much you use it, it could make the class less personal like you're just learning from the iPods of your teacher or working with your classmates or things like that.

Moderator: So you wouldn't have sort of the personal interaction that you get from being in a classroom. All right. Now we talked about this as primarily the content that you've experienced as being targeted towards non-science students. So consider for a minute middle school and high school students you might be taking introductory-type science classes. What do you think about their use of this tool and the videos that you saw? Do you think that that would be an appropriate audience? How do you think they might react?

Non-science P3: I think they would think it was like cool and exciting that you get to use an iPod for school and they'd be more inclined to pay attention and watch the videos.

Moderator: Ok. So you think that it would be, it would help them pay attention. They would find it interesting. Again, think about this younger age group. What do you think their responses would be? So you're saying that they would be interested. Anybody else?

Science P7: I think that this would be good for homework assignments in that age group because I know that, I remember in my middle school we watched science videos like Bill Nye the Science Guy. Like if we had stuff like that on an iPod I would be more inclined to do that for homework. I'd be interested in probably watching a video and maybe answering a few questions that I could turn in the next day if I'm a student like that. I mean I would be happy to answer those questions after I watched an interesting video, like it would be fun.

Moderator: Ok. So some of you are saying that it would be interesting because, what parts would be interesting? What elements would make it interesting?

Non-science P1: (21:35) I think that some at some point it's just the technology. Being able to use quote-unquote a high tech device in the classroom during that age would be interesting for those students and being able to connect it with what they do in the classroom certainly would interest the students.

Moderator: Ok. And let's look at middle school versus high school versus college. Starting with middle school, do you think that there would be a difference between middle school students and high school students with respect to the iPod and using it in a classroom situation? How many of you think there would be? Ok. How many do you think no? Ok. Let's start with the ones that think there would be. What do you think the difference would be if you think there's going to be a difference?

Non-science P2: As far as maturity levels go I don't know how much you could trust a middle school student with something that expensive and, 'cause they can be kind of careless sometimes. Not have a lot of respect for other people's property. So I would be kind of worried about the monetary implications with giving middle school students something this expensive.

Moderator: Ok. Those of you who thought there would be a difference, are there any other reasons why you think that way?

Non-science P3: I think the younger the students are the more there is a novelty factor in using the iPods, like 'Wow. Cool.' You know the older you get, the more likely you are to have your own video iPod and just be like 'Oh, well.'

Moderator: Ok. Anybody else?

Non-science P1: I also think that middle school students would probably, going with the maturity factor, I think middle school students would probably use it just for entertainment, for songs, for listening to music, watching podcasts from some other web site or for their entertainment and not academically because... Well from my experience with middle school students they, unless you sit them down in a classroom and teach the stuff to them they're not going to really go out on their own and start learning things. You need to sit them down and teach it to them.

Moderator: Ok. Anybody else?

Science P6: I think high school students, depending on which kind of group of high school students you're using would have more of the self-discipline necessary to actually sit down and watch the videos. Middle school students might get kind of bored. But that might be kind of a good thing because they might be able to pause it and come back and watch it later, but I don't know...

Moderator: Ok. Now, let's talk about college students. Do you think that this tool and the content, video podcasts delivered through a mobile device like an iPod, do you think it would be effective in introducing college students to the field of genetics? Yes or no? Let's just go around the room, and what do you think?

Science P7: I'm going to pass, and (can't make this part out)

Science P6: I think it could be kind of effective I mean maybe...like you said earlier, like the non-science.

Moderator: Like a non-science, yes.

Science P6: Yeah, because they're really (sure) and they don't have a whole lot of information I think, but introductory kind of stuff would be useful.

Moderator: All right. So you think it could be useful.

Science P5: I agree in that non-science background people might be more inclined to be interested in this rather than people with science backgrounds but people who already have a background in science I don't think it would influence them that much because they already know like what they want to do and it's not going to change that.

Moderator: Ok.

Non-science P4: Do you mean like for a class or just for...?

Moderator: Become more interested in the field, yeah.

Non-science P4: Well I think if, if they had some interest already then I think it would be useful but I think if they're not really interested at all then I don't think they're going to take the time to download the videos and look at them. But if there's some interest there then I think it would be helpful.

Moderator: Ok.

Non-science P3: I think it can especially because so many students already have the iPods and they can download these things. I know when I was watching some of the videos I was sitting next to one of my friends who's not in this field and was like 'What are you doing?', and I showed him some of the videos and he thought it was cool and interesting, so...

Moderator: Ok.

Non-science P2: I agree for non-science people it might spark an interest there and help them to actually learn the material and maybe pay more attention to it. But I don't know about people who already have that kind of background.

Moderator: Ok.

Non-science P1: I agree with all of what you guys. It definitely will help non-science majors, kind of spark their interest in the field. Maybe not give them too much information but just enough to spark that interest and maybe do some more research into the matter on their own.

Moderator: Ok. And did you want to comment now?

Science P7: I will comment. I think that non-science majors are non-science majors because they don't have, or because they know that they're not good at science or they don't have that much interest. I think if they watch those videos they would gain some interest, they would gain an understanding for those fields. I don't think it would necessarily influence them very much into going into going in that direction because they know they're not interested at science already. For science majors, I think a lot of science majors don't know exactly where they want to go with their science major. People in microbiolgy find biology interesting but they don't know where it can lead them. So I think it's good, it's really good for science majors to understand by using the iPod what different fields they can go into.

Moderator: Ok. All right. So maybe a way to more focus on genetics for people are just generally interested in science. Ok. All right, now each of you has an iPod in front of you and I'd like you to turn it on and view three video podcasts which you probably have looked at before. But I want you to do this before we finish up and answering the last set of questions. And the three that I'd like you to view are first Bees: Life of a Bee, Space Plants: Grow Baby Grow, and Muscular Dystrophy: Solving the Puzzle. So if you would just view those in that order. Take a few minutes to do that and then we'll ask a last set of questions and then we'll be done.

Non-science P1: My iPod died.

Non-science P3: You can use mine instead

Moderator: Great. Well, that's going to be a problem. Right?

(Talking among students.)

Science P7: What was the order again?

Moderator: Bees: Life of a Bee, Space Plants: Grow Baby Grow, and Muscular Dystrophy. Maybe you can double up and work together. Would that be possible? It's going to be hard because of the earphones. But you've seen them before, yes?

Science P7: Yes. You can do it with earphones. You can share earphones.

Moderator: Bees. The first one is Bees: Life of a Bee, have you seen that one?

Non-science P3: I don't think I have that one.

Moderator: You don't think so?

Science P7: I saw that one. I don't know if it's on this.

Non-science P3: I have a bunch of bee ones but I don't think I have Life of a Bee.

Non-science P2: Yeah. Me neither.

Moderator: Ok. All right. So do you have Space Plants: Grow Baby Grow? Is that one there?

Non-science P2: Yeah.

Moderator: Ok. If you guys can look at that one then. And then the other one is Muscular Dystrophy: Solving the Puzzle.

Science P5: This should be under the movies part?

Moderator: Yeah. You don't have it at all?

(Talking among students)

Moderator: So maybe if we could, so which one do you guys all have? Is it the Space Plants one, is that the one everyone has? All right. Why don't you, if you would view the Space Plants one and then pass it to your neighbor who may not have their iPod functional. How does that sound?

Science P7: I have Life of a Bee. Should I watch that one now?

Moderator: Why don't you watch Life of a Bee then. It's not (removed). The person who put this together isn't here currently so, we'll make this work.

(shuffling sounds)

Moderator: If you could pass that to somebody.

Science P7: I watched Life of Bees.

(Student sounds)

Non-science P1: Well mine was like, I guess I forgot to turn mine off.

Moderator: That can happen.

Non-science P1: So...

Moderator: If you can pass that one down and then everyone can view one of these.

(Time passes) 34:50

(students talking quietly, Moderator talking quietly)

Moderator: All right. Ok. So obviously everyone had a chance to view at least one of the videos and as we've discussed the video podcasts are meant to introduce the viewers to areas of genetic science. So how well do you think the video you watched did that? Just generally. Anybody have a comment on that?

Science P7: Introduce them to genetics?

Moderator: To some aspect of genetics.

Science P7: I watched the Life of Bees and they really didn't say anything about genetics. It talked about the reproductive, how they reproduce or... The guy kind of squeezed the thing out. I thought that, it didn't really have genetics in there but it was really interesting. I can't believe he's like squeezing the thing out of the bee and I'm just going to remark on this, he says 'Yeah, it actually dies in the process.' but he's like killing it right there in front of you. I just thought it was crazy but that was really interesting to me and if he had said something, he didn't really say anything about genetics but if he did...

Moderator: Ok. How about other folks that say the Space Plants?

Non-science P3: Did that say anything about genetics either? It talked about plants and photosynthesis. So it kind of introduced the topic and if it peaks your interest you'll find other information but it didn't really say anything about genetics.

Moderator: Ok. Any other comments about how, let's just say, how these video podcasts conveyed a specific science not genetics, any kind of science.

Non-science P3: I don't know. I liked the form of the video, how like it was a scientist talking to you because first of all it felt more personal like the scientist is explaining this to you and then in addition to that there were cartoon images and things that while they were talking it kind of illustrated what they were talking about. It was easier to like visualize.

Moderator: Ok. You mentioned the graphics, the titles and the graphic elements. Did they help you to understand or were they distracting? What did you think of the graphics? You said that you liked them. Anybody else? Any comments on the graphics?

Non-science P4: I think they helped (you) understand what was going on because it showed like, well in ours it showed the different wave lengths of light and which ones the plants need and which ones it didn't really see, and we could see what she was talking about.

Moderator: Ok. Any other comments about the graphics?

Non-science P2: I agree with what they both said.

Moderator: So in general everyone thought that they liked the graphics and did you generally think that they helped you understand?

Non-science P1: They certainly made it more interesting and kind of kept my attention on, kept my focus on what was being conveyed through the video.

Moderator: Ok. All right. How about the lenght of the podcasts? Too long, too short, just right?

Science P7: Too short.

Science P6: A little short.

(Student agreement)

Moderator: Short. Everybody thinks they're short. Too short. Ok. You've seen other videos. Even though you weren't able to look at all three of these, you've seen other videos through the assignment right? Right. Which one of the ones you saw did you like the most?

Science P7: The Bees one.

Moderator: You liked the Bees one. All right. Ok.
(laughing)

Moderator: Of any of the videos you had your iPod, which one did you like the most and which one did you like the least?

Non-science P2: I already mentioned the one on the Queen of Sheba.

Moderator: You liked that one the most.

Non-science P2: Yeah.

Moderator: Ok.

Non-science P2: I don't really know which one I liked the least. Ummm. I don't know.

Moderator: Ok. Anyone have a different favorite or one they didn't like that much? No? Ok. So to conclude, we've talked about using mobile devices and video podcasts in the classroom. What suggestions would you make to instructors who are thinking about using mobile devices like the iPods? What would you, what kind of suggestions would you have for people who are going to try to teach with this? What would you tell them to do?

Non-science P2: I think they should probably have questions that go along with the video to make sure the kids are actually watching them and paying attention when they do.

Moderator: Ok.

Non-science P2: And to kind of reinforce what they learned from the video.

Moderator: Ok. So, discussion questions of some kind. Ok. All right. Anybody else? What would you tell a professor who wanted to use these?

Non-science P3: I don't know. I guess along those same lines, I think the videos would be best use as like supplemental homework after a lecture and then like you tell the students the next day in class we're going to talk about this video so they're more inclined to actually watch it and they won't look stupid just sitting there and not saying anything.

Moderator: Ok. Any other suggestions for professors?

Science P7: Yes. Once they find the videos which probably isn't that easy, but they have to find good videos they have to ask questions about those videos like for a homework assignment. That's what I see as the best way of doing it. They have to ask questions and so that way they know the students watched the videos. They can't just say 'Watch these videos and come back to class and we'll talk about them.' because I know a lot of students would not watch the videos. They'll just come to class and like make-believe and try to engage in discussion, and just add to people's comments. Because they'll get by without watching the videos. They have to answer questions.

Moderator: Right, right. Ok. All right, so you kind of like the idea of having questions that go along with the videos. Ok. Any other suggestions or comments that we haven't discussed about the iPods or the content on the iPods?

Non-science P1: I think the iPods are a helpful, as I said before, are helpful devices but definitely you can, because of the cost factor, I think using projectors or posting the videos on the web site or the professor's web site or something like that to minimize the cost is simply as effective as putting them on an iPod and it costs less. I think that whatever message the professor, instructor is trying to convey or whatever lesson the person wants to teach can certainly be done through the internet. Posting the videos online so the students can watch them at home on their laptops is simply as effective as putting them on iPods.

Moderator: Ok. Let's go around and get a final comment from everybody. Suggestions, comment.

Non-science P2: Regarding what you were just saying, not every student is going to have a computer that they can go home to watch videos online. So if teachers do use the internet to post videos I mean they may have to go to the library or go somewhere else to do it. So I mean it's nice that every kid would be assigned one but then there's still going to be the problem of the cost, of how expensive iPods are and everyone having one.

Moderator: Ok. Final comments, suggestions?

Non-science P3: I agree. I don't think the iPods should be used in every class you know. I think it should be a highly selective environment when you try to use them but I think that they could be useful.

Moderator: Ok.

Non-science P4: I agree. I think that teachers shouldn't use them too much, just when they really think it's a good idea to use them because using them too much will just...people will stop using them. And also like making sure the videos can be downloaded onto the iPods. I don't know the logistics of that, how that would work, whether the teacher would do all of that or they would be posted. I don't really know if they would have capability. Where would they post them, like middle school and high school teachers.

Moderator: Ok.

Science P5: Well I think the main problem is the cost but if you ignore it I think it's beneficial because, just for the fact that you can put it in your pocket, you can watch them wherever, whenever but if you have laptop when you doing that you have to haul around a laptop. That would kind of get annoying after a while but so, if you ignore cost I think it should be used in certain, certain classes. Certainly not all of them. Just selective ones.

Moderator: What kind of classes would be an example?

Science P5: Ummm. Mostly, just because I'm a science person I'd say science classes. Certainly not math and stuff like that but I'd say advanced kind of science classes.

Moderator: Ok. All right. Final comment, suggestion?

Science P6: Yeah, I think you need to kind of be selective in the classes that you would use them in just because of the fact that maybe some of the students may not be responsible enough to handle the iPods or to actually watch the videos otherwise. So you just kind of you need to make sure that they would actually fulfill the required assignment on the video iPods.

Moderator: Ok.

Science P7: I think, I just thought about it that it could be used for writing classes if they have a video and they have to write a paper on it. I don't know if that would be a good idea, and I don't' think it should be used in college because most college students have access, easy access to a computer or laptop. And it would be good in high school because those, especially because those students don't have laptops most of them. They might have computers but most would appreciate easy access to portable videos. Cost, I don't think cost is an issue because most, I feel like in five to ten years or whenever this would be used in classes, most students will have video iPods and really the issue of cost is only to those who don't have the iPods because probably they can't afford them and when they do that and they rent them out they have the risk of losing it. So it's only an issue for those that can't afford to get their own iPod.

Moderator: Ok. All right. I'm going to summarize our discussion this morning and basically, in general, most of you do not use the iPod to download and watch videos. You usually do that on a laptop computer or a television. Most of you the iPod as, if you have one, as background for music. You watch video primarily for entertainment but a few of you do, have watched video lectures that have been assigned in your classes. Perceptions of mobile devices and learning, most of you feel that the iPods can be an effective tool as supplemental material in a classroom setting. You felt that the technology did peak your interest and the content, the videos that were on the iPod you thought would do that particularly for non-science students. For science students you thought that it wasn't as, it wasn't in depth science but it was designed for non-science students in particular. You thought it was something that could be effective in that way. The majority of you felt there would be some differences between middle, high school, and college students. Although that was not a consensus and perhaps middle school students being younger might be less, less conscientious with respect to not losing the iPods or failing to bring them to class. You again thought for college students it would not be a primary form of instruction, that would not be a good way to utilize it. And you looked at the videos, we weren't able to see all the same one but the ones we did see were the Life of a Bee and the Space Plants. You thought these videos did provide a good introduction to the material although it didn't talk about the genetics per say. You liked the graphical elements, thought those added to your interest and attention. Thought the videos were too short. Not a real strong feeling about a particular video that you've sees as being really ineffective. Some of you did bring up some ones that you liked like the Queen of Sheba or the Life of the Bee one. And in general the suggestions for instructors utilizing iPods would be to include questions along with the videos and again to utilize them in a supplementary kind of way. Some of you did mention that there are other ways to do this that were less cost effective and that in terms of potential barriers probably cost would be one of the ones that would need to be considered but taking that aside they might be useful in a supplemental way in the classroom. Is this an adequate summary? Am I missing anything? Ok. Well thank you very much for taking your time to share your opinions of this technology and it's been used in Dr. Gallo's class. I really appreciate your participation and you've provided us with some good insight so those of you that brought your iPods you need to sign those back to me and then you're done for today. (49:45)

APPENDIX E
FOCUS GROUP 2 TRANSCRIPTS

Focus group starts at 2:15

Moderator: All right. Well, thank you very much for coming today for this focus group session. Has anybody ever done a focus group before? Ok. Well, this is basically a group interview where I'll be going around the table and asking a series of questions and asking you to provide some input on your perceptions about the assignment using the iPods in Dr. Gallo's class. And before we get started I have to a little short script that talks about what we're going to be doing today so I'm going to do that and then we're going to go ahead and get started and the focus group is going to take about an hour today so let's begin. Welcome to our session today. Thank you for taking the time to join in this discussion about mobile learning technologies and their affect and influence on students' learning. I'm Tracy Irani. I'm an associate professor here in the department of Ag Ed and Communications and also helping me today is Alli Eckhardt and Christy Windham who are grad students in our department. The university is sponsoring this focus group because we want your feedback about using mobile devices and the podcasts you viewed on the iPod to facilitate learning. Before we begin I need to share a little bit with you to make our discussion easier. Since this is a group interview and we're really interested in your perceptions and viewpoints I want you to know that there are no right or wrong answers today, but rather differing viewpoints. I want to encourage all of you to speak up and to tell us what you think in response to the questions that I am going to be asking. Please feel free to share your viewpoint even if it differs from what others have said. Please speak up and talk one person at a time. We are audio and video recording today but once that's done we will transcribe the notes from the sessions and we will destroy the video and audio recordings. So your name will not be associated with any of the findings from today's focus group. We're on a first name basis. Now often when we do focus groups we do name tents with your name on it. We don't have that today so I'll just be pointing at you and I do apologize in advance if I do that. I may also go around the room and ask each of you to respond one after the other so that we make sure that we get everybody's opinions. You may be assured of confidentiality. As I've said your name will not be associated with any of the findings from today's session. I'm the moderator and my role here today is to question and listen. I won't be participating directly with the focus group but I will be asking questions. I want to make sure I facilitate your ability to talk freely with one another as well as answer questions. There will be about twenty questions and as I said it will take about an hour. And I will be moving the discussion from one question to the next. There's a tendency sometimes for people to talk a lot and others not to talk too much. I want to make sure that everybody gets a chance to talk so as I said I will sometimes ask each of you to respond just to make sure we get everybody's opportunity to talk. If you have your cell phone or pager of some kind please turn it off at this time so that we won't be interrupted. As I said we will be discussing mobile devices and video iPods and for our discussion mobile devices are defined as handheld personal devices like the iPod or an MP3 player or cell phones that have the capacity to play video or audio files. Video podcasts will refer to video that play on these mobile devices. Ok? So when we begin I'll be asking each of you to respond to the first question, tell me your name and your undergraduate major. So let's go ahead and get started and I'd like to first start by asking a little bit about your experience this technology, the video iPods and video podcasts. So considering mobile devices which include the iPods, MP3 players, or cell phones I'd like to ask each of you if you watch video on any of these kinds of mobile devices. I'm going to start over here.

Non-science P8: Like besides what you gave us?

Moderator: Yes.

Non-science P8: I never have.

Moderator: And tell me first your name and major.

Non-science P8: Oh, I'm sorry. My name is (removed) and my major is political science.

Moderator: Ok, so you've never watched video before on this kind of mobile device?

Non-science P8: Right.

Moderator: Ok. All right.

Science P9: My name is (removed) and I'm a double microbiology and animal biology major. I've never watched educational videos on these. I've watched like YouTube videos. That sort of thing.

Moderator: On your iPod? Ok. All right.

Non-science P10: My name is (removed). I'm a civil engineering major and I've never watched videos really on mobile devices.

Moderator: Ok.

Non-science P11: (removed). Economics major. I've never owned an iPod myself but I've watched videos on my friends' iPods and stuff like that.

Moderator: Ok.

Science P12: (removed). I'm a biology major and I've never watched educational videos either. I just watch music videos on the iPod.

Moderator: Ok.

Non-science P13: I'm (removed) and I'm a political science major. And I've never watched videos on any kind of device.

Moderator: Now how many of you own an iPod by the way? Ok so that's four of you. And what do you normally, what do you normally watch, what do you normally do with your iPod, those of you that own one?

Science P9: Just listen to music mostly.

Non-science P8: Yeah, just music.

Non-science P13: Mine's just a music iPod.

Science P12: Music mostly.

Moderator: Ok. All right. There are at least two of you that have watched video, entertainment video on an iPod before. What do you like about watching video or what do you think of watching video on an iPod?

Science P9: If it's short it's fun. You know it's fun if someone has a funny video and they downloaded it and they say 'Oh, hey watch this really quick. But anything too long, it's kind of a small screen.

Moderator: Ok. And there was someone else who had done it.

Science P12: Yeah, well usually I'll just if I want to show my friends a video I'll be like this will be fun to show later. Or like sometimes like I'll put episodes on there of my favorite show and then I'll just like watch it but that usually doesn't work that well I guess because like she said it's small. It's kind of fun.

Moderator: All right. Ok. For those of you that don't watch videos on mobile devices, why don't you do that?

Non-science P13: The device is too expensive to buy.

Moderator: Ok.

Non-science P8: And I have to pay for it myself.

Moderator: All right. So it's expensive. Anybody else?

Non-science P8: That's about it. I mean...

Non-science P8: It's too expensive to go out and buy one.

Moderator: Ok.

Non-science P10: I don't own an iPod myself but it's just I don't really have, not have the opportunity, but I mean I don't spend a lot of time with the iPod or listening to music or just like in a place where I can just watch something. So it's just out of my lifestyle I guess. I don't know.

Moderator: All right. So it's wouldn't be part of your normal lifestyle.

Non-science P11: I think it's more, it's just as convenient to watch a video on a laptop or anywhere on campus because there's like five or six computer labs on campus. So if I need to watch something I can really, it's really convenient to find a computer and watch it on a bigger screen that way. (10:00)

Moderator: Ok. Now how many of you, show of hands, have watched videos on a laptop or a computer before? So that's everyone. Ok. All right. Now let's talk a little bit about your perceptions of the mobile devices that you, the video iPods and learning. Each of you, as part of Dr. Gallo's class, viewed podcasts on an iPod to complete some reflective journal questions and the lesson plan assignment. So now I'd like to ask your reactions about that experience. So first, how did your experience with viewing video podcasts on an iPod compare to watching videos in a classroom setting? And I'm going to go around the room and ask each of you to comment on that. So how did viewing it on the iPod compare to watching a video in a classroom?

Non-science P8: I don't know. I guess it's kind of nice just to be able to, like you're just in your room and it's just you listening to it. There's no distractions and it's just, it's more like a, I don't want to say personal, but that's the only word I can think of, it's more like a personal experience.

Moderator: Ok. So it's you and the technology. Ok.

Science P9: It's more involved because when you sit down and watch it you are setting aside the time to say 'I'm going to do this right now.' and you're actually watching, like not so much in college but in high school when a teacher put a video on that was an immediate excuse to go like this and start talking to your friends next to you.

Moderator: So with the video iPod you are more focused.

Science P9: Right.

Moderator: Ok.

Non-science P10: It's really convenient just because the videos you can watch them anywhere, on bus or just walking to class. Whatever you want. Well, I guess not really walking but anytime you can watch it and you're always to be ready to watch it, willing to watch it and awake. And like she said in a classroom it's just up there. It's not in your hand and you're not focused on it. So it's a lot easier to pay attention if you have it right there with you.

Moderator: All right. It helps you pay attention. All right.

Non-science P11: I agree that you focus on it if you watch it. I mean I know I wouldn't watch it outside the classroom. I mean even, there's no reason to. It's just extra stuff. Kids don't even do homework when it counts for a big portion of their grade. They're not going to watch a video iPod. They're like, it's like you said it's very involved. And it's too involved for me to, I mean in high school. I mean I'm in college, not high school, and it's too involved for me to actually watch it on my own time.

Moderator: Ok.

Science P12: Well I felt like it was good because it was more accessible. You could watch it anywhere but I also felt like I paid less attention to what was in the video. Like I mean the videos were interesting but if it was like a video that wasn't as interesting I probably would be more receptive watching it in class because I'd know that I'd have to do it for like a grade or the teacher might ask me questions afterward or something. It just wasn't like as, I guess I wouldn't remember it as much.

Moderator: Ok. All right.

Non-science P13: Well the videos on the iPods were so short that I just slipped them in whenever I was the most relaxed, like I'd watch them during commercial breaks when I was watching TV or when the weather was nice I'd take it outside and like lay on the grass and watch them. And that was better for me because it wasn't a rigid desk and seats that I...

Moderator: Ok. All right. Now let's talk a little bit about the content, the video itself that was on the iPod. And what did you think of the content and how, and how did it influence your ideas about genetics? Or did it influence your ideas about genetics? So what did you think of the content and what did it do with respect to your thinking about genetics?

Non-science P10: I thought the content was good and that it provided real world examples and real world applications of genetics, not just sitting in a classroom learning that this gene goes this way, you know those kinds of things which are very important, what it's all based on. But it kind of brings it all together when you can watch a video that shows how this is applied to the real world. And also like the length of them. (cough) Excuse me. They were short which kept your focus on them and got to the point and the longer the video it seems like the less I pay attention and the less I learn from it. So I thought the length was good as well. (14:37)

Moderator: Ok.

Science P9: I thought that it was a good format to learn like the human interest aspect of it. It's a good way to access interesting research but I don't think if it was trying to teach basic concepts like what he said they teach in a classroom I don't think it would have really worked as well.

Moderator: Ok. And why would it have not worked?

Science P9: Because you don't, when you're sitting there watching it you can't ask questions. Your teacher's not right there and the format is too short. I mean it's complex stuff that you're learning. You need to go through it slowly and have someone explaining it so you can ask questions when you need to.

Moderator: Ok. (15:00)

Non-science P11: I agree. I think the videos made by the STEP people were very effective. I mean like as just videos. I think they would be great but were they more effective on an iPod then if I just saw them on a projector in a classroom? I don't know. I don't think it would be that much more effective as an iPod. The iPods like (removed) touched on, they're not interactive. And if there was like interactive parts to the videos on the iPods like quizzes or something like that then I think it would be much more effective. But just as a stand alone video I'd rather just watch it in class.

Moderator: Ok. Anyone else with any comments about the content?

Science 12: Well I thought the videos were really interesting and they kind of like made me more open to genetics and like I didn't know that it could pass such a broad variety of things. And the only was that they were so short that I'd just started getting really interested in what they were saying and then it would just cut off. And I'd be like 'That's it?'.

Moderator: Ok. All right. How many of you thought that they were too short, the videos were too short? So it's a few of you. How many of you thought they were about the right length? Ok. All right. Ok. Now do you think using, and I know you've already commented on this, do you think using iPods and other mobile devices contributes to student learning? Yes or no? Do you think it helps you learn or would help students learn? Any comments on that?

Non-science P13: Depends on the videos.

Moderator: Ok.

Non-science P13: I that, well, like you said, if they're so short there's not much actual information going on there so if the videos are really short you're not learning much from them. Like they're interesting but... (16:00)

Science P9: I think these would help you get interested in learning. Like it was a good way to show that 'Oh, that's pretty cool.' but it wouldn't necessarily be the best. It's better to start the process or just provide extra information. I don't think it should be the only or the main part of it.

Non-science P13: I think it would be a good teaser. Like if you're starting a unit, you show these little snippets and then you're like 'Ok, this is the kind of stuff we're going to be learning about. Now we're going to go back and learn the stepping stones to it.'.

Moderator: Ok.

Non-science P11: I think for the highly motivated students they're, they're effective for having them learn outside the classroom. I mean it's a great starting point if they want to learn more on their own and then they can learn it and look it up online or something, get more information. But beyond the highly motivated, that marginal, I don't think it adds much to the experience. (18:00)

Moderator: Ok. All right. Now what do you think are the benefits and the drawbacks of using mobile devices like this in education? So what are some of the good things but also what are some of the potential drawbacks?

Non-science P10: I think one good that is that it gets the student involved a little bit in the learning. You know like I was talking about earlier, having it with you, they have to actively pursue that. It's not just being thrown at them all the time so that's a benefit and also just like they can watch it whenever they need to, you know. But a drawback would be accountability, whether they're watching it or not, and motivating them to watch. (18:51)

Moderator: Ok. Any other drawbacks?

Non-science P11: Cost. I mean $250. I didn't, I mean when you guys offered it to me I didn't want to sign that waver. I didn't want to be responsible for $250. It's like extra weight. I mean in high school half of these would probably be stolen. The other half would get lost. Other bad things could happen. I mean that's like, you could buy three textbooks for one iPod.

Non-science P13: If you're to say use it in some program in a school there are going to be some areas that can't afford to outfit their classes with a class set of iPods. So then you have the problem of some kids getting the benefit and some kids not being able to.

Moderator: Ok, so it wouldn't be equal in that way. Ok. Any other benefits or drawbacks that you see using these in education? Ok. All right. Now we've talked about using these tools in an educational context now let's look at particular groups of students. Now I want you to consider middle school students, high school, and high school students right now taking an introductory-type science course. Do you think this technology and this type of video would be effective and do you think there would be differences between middle school and high school students? Or do you think they would be the same?

Science P9: Middle school students, it would probably work really well because they would be, they haven't been jaded by the educational system yet. They're more, they would be more excited about it. And if you could show them some neat things they would probably get more into it. And high school, like someone brought up, you know half of them are going to get stolen or get broken. And you know they are kind of in that age they are going to blow it off. Like even if they had been interested in it it might not necessarily be perceived as cool because it's not the norm.

Moderator: Ok.

Science P9: And you know they might be more inclined to be like 'Oh this dumb classroom assignment. I'm not going to do it.' But like he was saying, for the highly motivated high school students it would be a really great supplemental resource but not everyone is highly motivated.

Non-science P13: I think it depends on the schools, like if it were my high school there would be kids that would do it and be interested in it. And the middle school experience I had we'd of just been like 'Whatever. We'll put our music on.' and not be thinking about the videos.

Moderator: Ok. All right, and you've had your hand up for a while.

Non-science P11: I was going to say the same thing like if you're looking at honors or AP students it might be a benefit. Typical classes, no. Even in middle school, like what you said.

Non-science P13: Middle school kids think everything is nonsense. They're at that rebellious age where you're just like whatever.

Science P9: Sixth grade, not so much. But once you hit 7th and 8th grade they're just like...

Non-science P13: Seventh and 8th grade they just go crazy. Game over. My sister, woah.

Moderator: So how many of you think there would be some differences between middle school and high school students and their feelings and use of this technology, show of hands? Most everybody, but you're questionable. Ok. You think they might be the same.

Non-science P11: There's, I think the difference between middle school and high school, there's a much bigger difference between honors students and non-honors students than middle school and high schoolers.

Moderator: Ok.

Non-science P11: And there's much more difference between the type that, like, like the different districts than between high school and middle school.

Moderator: Ok. All right. Ok, go ahead.

Non-science P10: I was just going to say I think it could be, could definitely be a good thing maybe not necessarily, kind of like we were talking earlier, not to replace the main form of learning from a teacher to the student. But I think it's important for a lot of students especially kids that aren't maybe science-focused or have those things in mind to get them involved and show them real-world applications and get them interested. Whether to, not necessarily to you know get them to choose a science major when they get to college but just to like get them interested so they'll want to learn more about it. So I think that could really help.

Moderator: Ok. Now let's consider college students like yourselves, do you think that video podcasts delivered through a mobile device like the iPod could be effective in introducing students to the field of genetics?

Science P9: As an introduction maybe but not as a basis for teaching the stepping stones. Like someone said earlier, it's more of a 'Hey, look at all the really cool research that you could be involved in if you do the work that you're given in a classroom.' I don't think it's necessarily a good tool for teaching like concrete ideas and concepts. It's more of a get you interested sort of thing, like a teaser like she said.

Moderator: All right, and any other comments on that? How do the rest of you feel?

Non-science P13: I think it was a great introduction.

Moderator: Ok.

Non-science P13: Because like I took it everywhere. It went all over the place.

Moderator: All right. Other folks? All right.

Non-science P11: I didn't see any difference between watching it, because we watched some of these videos in the classroom, I didn't see any difference between watching this in the classroom or watching it on the iPod.

Science P9: The biggest difference was just that you were able to watch it on your own time and like she said I'm more receptive to things like that when I'm relaxed, like laying on the couch with my hot chocolate or laying in bed and a commercial break. When it's on in the classroom sometimes you know I just came from an exam or I have an exam next period and, or I'm in a fight with a friend and my minds not on it, I'm not necessarily going to pay attention. If you have the opportunity to watch it on your own time you're more likely to be in the mindset for it.

Moderator: Ok, and how do the rest of you feel about it? Any other comments about how these might be used in a college classroom? What do you think? (25:00)

Non-science P8: I agree a lot with what she said just in terms of being able to watch it on your own time. I love my online classes that like you watch the lectures on your computer because you can watch it whenever you want which is great for me. I mean this is just kind of that, you know, continued to a greater degree which is nice. And I mean I'm not interested in genetics per say but I could see why those might help other kids get interested in genetics.

Moderator: Ok. All right. Now, now each of you had an iPod for this assignment and I'd like you to go ahead and get those out and anybody who doesn't have an iPod can get one of these here because I'm going to ask you to watch something on the iPod. So...

Non-science P10: I accidentally have them erased just recently.

Science P9: Yes. (laughing among students)

Moderator: You did? Well it's a good thing we have extras. Huh? All right. Know these iPods don't all have the same videos on them as we found doing the previous focus group so I've got three different titles here and we need to find out which one you might have on your iPod. So what we're looking for is Bees: Life of a Bee, Space Plants: Grow Baby Grow, and Muscular Dystrophy: Solving the Puzzle so you should have at least one of those on your iPod.

Non-science P13: Could you read those again?

Moderator: Yeah, the first one is Bees: Life of a Bee, the second is Space Plants: Grow Baby Grow, and the third is Muscular Dystrophy: Solving the Puzzle.

Non-science P11: I have the second one, Space Plants.

Moderator: Ok.

Science P9: I have the MD one.

Non-science P13: And what's the space one again?

Science P9: Oh, yeah, I have the space one.

Science P12: I have the MD and the Space Plants.

Moderator: Ok.

Science P12: I have Space Plants too.

Non-science P10: I don't think I have any of them.

Moderator: You don't?

Non-science P10: I don't think so.

Moderator: Do you want to try another iPod here?

Non-science P10: Yeah, I'll try another one.

Moderator: Those of you that have either the Space Plants or the Muscular Dystrophy go ahead and watch, watch those if you would.

Non-science P10: I have the bee one on this one.

Moderator: Go ahead and watch that. (27:50)

Non-science P11: Which Space Plants one was it?

Moderator/student in unison: Grow Baby Grow.

(Time passes)

Science P12: Do you want us to watch another one?
(student mumbles)

Moderator: Yeah, go ahead and watch two. Yeah. (29:30)
(Time passes - talking starts around 32:00)

Moderator: Ok. So everyone's watched at least one of these videos so I'm going to ask you your opinion of what you thought of the video and also in addition to what you generally thought of it, how well you thought each video conveyed a specific aspect of science. Let's start over here with you.

Non-science P13: Ok. Well I watched the Muscular Dystrophy video and I thought it was really interesting in the way it presented the idea because it explained very clearly but really simply what Muscular Dystrophy was and then like the possibilities that people are researching to, to make it better. And I thought that I've never read or seen anything about Muscular Dystrophy that was more interesting and grabbed my interest quicker than that video did and it was like 10 seconds long.

Moderator: Ok. All right.

Science P12: Yeah, I watched the same Muscular Dystrophy video and I thought it was really interesting if I was, if I were to like to read on the internet or in a textbook what Muscular Dystrophy was I'd probably space out but it was really interesting the way that they presented it. And it was nice. I liked it.

Moderator: Ok.

Non-science P11: I watched the Space Plants video and I mean the videos were very effective. I mean, yeah, well I'll say good job on producing those videos.

Moderator: Ok.

Non-science P10: I watched the Space Plants as well. I thought it was good and I thought it was interesting about the way the plants don't use all of like the spectrum of light to grow and stuff so it was definitely interesting.

Moderator: Ok.

Science P9: Yeah, (mumble) and I thought in both cases it was really interesting. It peaked my interest in the subject but I was kind of left like 'Oh, that's all they're going to tell me.' like you know, you know, they're accomplishing their goal but...

Moderator: You wanted more.

Science P9: Yeah.

Moderator: Ok.

Non-science P8: I watched the Bee video and I mean it's a good video. It's kind of, it just really reminds you of something you'd see on National Geographic or Discovery Channel or Animal Planet or something like that, which is always good because I love all of those shows and so it was interesting. It's was kind of short too but also I mean so that's kind of the point, so it was good.

Moderator: All right. And how about how well the video you watched conveyed a specific aspect of science? Any thoughts about that, about how well the video conveyed science?

Non-science P11: I think it was a little bit too specific of an aspect of science like I learned exactly like 'Oh plants use exactly these wavelengths to grow.' and you can make a lamp just for those lights but that's it. If it was like more interactive, like show me more, and click it I think it would be ten times better. Like if there was a button that said 'Hey, watch the next video.' and just hit next like you can see like, if you want to see like, like give the option of two different videos like where you want to take it like a tree and then you can...It needs to be more interactive for it to be better I think.

Moderator: All right. How do the rest of you feel about that?

Science P9: I feel like they are really specific and they definitely explain the specific idea that they were trying to get across very well but in doing so some other ideas that might have been important might have gotten skirted around. For example in the MD one he just kind of mentioned that it's an expansive protein and you hear that term and you're like 'Wait. What is that?' and you might miss the next couple of things he says because it's not really a term he really introduced or said what it was. If don't know what it was it's something completely new. And that's just one example and I mean they're trying to keep it brief and they do do a really good job of keeping the science-speak out of it for the most part but like that would be a drawback is that you can't keep all of the science words out of it but then you have to walk that line.

Moderator: Ok. All right. Any other thoughts?

Non-science P13: Well, I think that the MD video did a really good job of the specific science bit because not only did they talk about what the disease was but then they talked about how they would fix it by injecting the DNA and expressing the gene in and expressing it the way it was supposed to be expressed. And I think that she's right that there were a couple of science terms that I wasn't familiar with but if a teacher were to ask the students to watch that video on an iPod they could probably go over in class the different terms that they wouldn't be familiar with so that by the time they watched the video they would be familiar with them.

Moderator: Ok. All right. Now what about the titles and the graphical elements used in the video podcasts? What did you think about those?

Non-science P13: The graphics are what made me understand what Muscular Dystrophy was because he explained how some of the tissues didn't grow properly but that was just like, I imagined like a stumped thumb or something but so like the images indicated that apparently whole limbs don't develop. I didn't know that at all. So...

Science P9: Especially for people who are visual learners, the graphics are really good. It's helpful to see pictures.

Moderator: Ok. Other thoughts about the graphics? What did you think?

Non-science P10: I think they were done very well. I think it looked really, everything looked very professional and very clean and sharp I thought which I don't know kind of helps you to watch it a little bit more like makes it, like in a way gives more validity to it. Because if it looked like it was made it somebody's...

Non-science P13: Basement.

Non-science P10: Basement, it would just kind of be like 'Oh somebody just made this and posted it.' But it looked very professional and the graphics were all done very well and also the titles were interesting. It's not just like a title with a big science word like talking about what they're talking about. It was like 'bees this' or something so you could kind of get a feel for what they're talking about.

Moderator: Ok. All right. Now let's talk a little bit about length. How was the length of the video that you saw? Was it too short, too long or just right? How many of you thought it was too short? A few of you. How many of thought it was about the right length? Ok. Did anyone think it was too long? All right. So you know it seems like there's a mix between those short and...Those of you that thought it was too short, why did you think that?

Non-science P11: I think we've already pretty much said all the reasons like it just stops abruptly, it's too specific like you can't just find out more information easily, you can't expand.

Science P9: If it's something you're interested in you just kind of get left feeling like you wanted more but, but they are the right length for their purpose because their purpose as far you can tell is just to get you interested and prompt you to go learn more about it so it would achieve that goal.

Moderator: Ok.

Non-science P8: I was kind of saying the same thing, like it's kind of a tough question because if you're interested in it then like then like you're going to want to know more so it would be too short but if you could care less then it's going to be too long no matter what so it's kind of a tough question.

Moderator: All right. Now you've seen the videos you saw today and you've seen other videos as part of the assignment for this class, right? So do you have a favorite one that you enjoyed the most or one that you really didn't like that much of the ones that you've seen either today or overall generally? Anybody have a favorite?

Non-science P13: My favorite was the Muscular Dystrophy one.

Moderator: Ok.

Non-science P8: I was going to say that I liked the bees one.

Moderator: You like the “bees” one.

Non-science P8: It was good.

Science P9: I liked the FIV ones just because I'm pre-vet so it was applicable.

Moderator: Ok.

Non-science P10: I liked the “bees” ones. I thought they were very interesting.

Moderator: The bees. Ok.

Non-science P11: I liked the space ones but that's just because I like space.

Moderator: Space. Ok. All right.

Science P12: I liked the “bees” ones, the ones that I watched previously.

Moderator: Ok. Are there any that you did not like or thought were not as, you know, didn't like them as much?

Non-science P13: I didn't like Space Plants. I'm not interested in plants. I like to grow them. They're pretty. I don't really care how they grow, as long as they grow.

Moderator: All right. Anyone else? All right. Ok for our final concluding discussion here. We've talked about using mobile and video podcasts in the classroom and what suggestions would you make to professors or instructors interested in mobile devices like the iPod in their classes? What kind of suggestions would you give to people who were wanting to teach with this particular tool?

Science P12: Use them as a supplement.

Moderator: Use them as a supplement.

Science P9: You have to have a way to control it too because I think a bunch of people brought it up that if kids aren't going to do a homework assignment that actually affects their grade then you know they're not going to watch this on their own time.

Moderator: Ok.

Non-science P11: Well, accountability needs to happen like if you're going to show them then you better have a quiz asking 'What do you think about this?' even if it's just like, it doesn't even have to be specifically like 'What's this and this?' like 'What did you think about it?' like something. Also, I think one of the good ways this could be used as far as like in a history class you know we always read about like these great speeches that all these people did but then there's only like maybe a paragraph, not even a paragraph there's like one or two sentences excerpted like Martin Luther King's speech, maybe like 5% of the people who graduate have read the whole thing, less have even watched or heard the whole thing so how great would it be if it's like class period and everyone takes out their iPods and listens to that speech. I think that would be one good use for it but then again I really don't think, it's not worth it honestly.

Moderator: Ok. Any other suggestions?

Non-science P10: I think definitely like other people have said you know to use it as a supplement to actually learning or maybe other projects or extra credit, whatever it might be, but I probably wouldn't rely too heavily on it. Like we talked earlier, like your main focus is going to be, to want to be teacher to student learning because I think that's how students learn the best way. I think that to clarify things or maybe to teach, I think a really good use of it is to teach things that are hard to visualize like in our class we watched a video on mitosis and meiosis and like you can talk about all day long but if you can watch the chromosomes doing different things and things like that, it helps you visualize it in your head a lot easier then drawing it on a board or that sort of thing. So I think with those types of conceptual things that you need to visualize it would be really good.

Moderator: Ok. All right. Now I'm going to ask you, each of you, to give me a final comment, suggestion, final thoughts about your experience using iPod and the content that you viewed. So let's start over here again. Final comment, suggestions.

Non-science P13: I liked it as a theoretical research idea but I don't think it applicable, like widely applicable for like high school students or anything. It's nice for me because I don't like being contained when I watch things so, that's not the same for everybody though.

Moderator: All right.

Science P12: As for me I liked it except I think I'd probably be actually more receptive to videos in the classroom just because they're longer and they have more information. Like when it's short I'm like I want more except then I'm usually too lazy to go research it on the internet myself. So like in the classroom where it can be longer, because on the iPods you can't really have like several hour-long videos because it would take up all the space. So I think classroom video watching is better.

Moderator: Ok.

Non-science P11: I think when these separate videos from using the iPod themselves, I think like the videos you guys did were great. They'd be great in classrooms but I don't think that they'd be, I don't think that iPods should be used in high school. It's just the cost and the risks and everything, all the bad things outweigh anything good things that would come out of it because the good things are only marginal at best and the cost are very real.

Moderator: Ok.

Non-science P10: I think there's a lot of really like promising things with the iPods and really good things to come of that in the future. As of right now I don't think it's practical yet to do this but I think that it definitely, definitely could be used and definitely could do a lot of good with students and just getting them involved and just getting them interested in science and helping them to learn, facilitating learning. Not necessarily like teaching them, but just helping them to learn easier, a more practical way for them whether their visual or audio, whatever way that is. But I think that it definitely could be used one day.

Science P9: For me it was fun, like as she said as a research thing. It was new. It was cool. When we got it I called my dad, I was like you're not going to believe what we're doing. But it's, it would be, it definitely has potential. There need to be lesson plans and things designed specifically with it integrated. I don't think it will work if you just tack it on to something that already exists. So I think in the future it definitely has potential but there needs to be ideas expanded on how to use them.

Moderator: On how to use them. Ok, and?

Non-science P8: I thought they were, it's a really good idea in terms of learning. It's just nice that it's so accessible. You can watch it wherever you want, whenever you want, all that stuff. And plus it's just cool, like I was excited to have a video iPod. I thought it was awesome but that's just me.

Moderator: Ok. All right. Well let me summarize what our discussion has been today. Most of you said that you did not watch video on the iPod previous to your experience in this class, in Dr. Gallo's class. A few of you did have the opportunity to do that although most of you did not. Everybody, when they're watching videos usually are doing that on a computer or a laptop or a television. Most of you watch video, when you watch video are for entertainment purposes, a little bit for education. We talked about perceptions of mobile devices, and their relationship to learning. Most of you felt that the iPod was useful from the standpoint of generating interest, getting people interested in whatever content was being delivered on the iPod. You did feel that that in that way the iPod could be utilized and the videos themselves could be utilized to stimulate students' interest in genetics. They helped some of you understand and learn because it helped you focus. Others felt that it was distracting too as well. There are some benefits in using mobile devices in education primarily linked to increasing interest in students who might not have been known about the topic area before. There are some drawbacks. A lot of them have to do with cost and utilizing the mobile device as supplementary material and not primary form of instruction. You talked about middle school, high school, and college students. Many of you felt there might be some differences between middle schoolers and high school students. Middle schoolers might not take it as seriously but also might find it kind of cool and kind of interesting in that way. Most of you also felt that for college students iPods and video podcasts could be useful in introducing students to the field of genetics but just introducing, didn't feel that this would be a useful tool to teach genetics. We looked at the different videos, the space plants, the bees, and Muscular Dystophy. Most of you felt that the videos were effective. You liked the videos, thought they were interesting and kept your attention. You felt they did convey some elements of science. You liked the graphics and the titles in particular, thought those really stimulated the learning experience for you. There were mixed viewpoints about the length. Some of you thought that the videos were too short. Others thought they were about right. You liked the videos that you saw. Many of you mentioned the bee video or the space plant video or the Muscular Dystrophy video, and one person mentioned the FIV videos because of interest in pre-vet. Overall in terms of suggestions to give to those who might interested in teaching with video iPods, utilize them as supplements, make them more interactive, have some interactive quizzing or branching kind of device so that students could choose which video they are going to watch. There was also some commentary that the videos need to be separated from the iPod technology, that the videos in and of themselves could be looked at just as easily on a computer screen or on a projector versus the technology. Finally, in terms of final comments and suggestions some of you felt there was great potential, that there would be more to come from Apple with the iPods. Some of you felt that the cost outweighed any of the potential gains that could be made, at least at this particular point of time. Is this an adequate summary of what we discussed? Any thing I'm missing out? Anything else I'm missing?

All: No.

Moderator: Well thank you for taking time today to share your opinions about this technology and about the videos. Your participation is greatly appreciated and we've gained some valuable insights so thank you very much. And I've got a contract sign-in sheet and I'd like to just check your name off as you drop the iPods before you leave today. Thanks again.

APPENDIX F
REFLECTIVE JOURNAL ENTRIES FOR WEEK 1
10-1-07

Non-science P11

Hello!

I was very skeptical when I was given a video iPod. Partly because I've never had an iPod, and partly I didn't like the responsibility of $250. Obviously i had a bias from the beginning, but i tried to keep an open mind.

On the whole I felt that any benefits gained from having these iPods was far out weighed by the costs. The main benefit was the ability for videos to be watched on my own time. Also the addition of some interactivity helped. I felt that I was in the "mood" to watch some genetics videos. The hope is that the student will pay attention because when they watch it at home or were ever, they will pay attention.

Overall, I feel the iPod's were unnecessary. First, they will get stolen in high school. The class TI-83's were stolen from my math class. Second, I rather there just be a link from a class website to YouTube (or download it) then have to be responsible for my I-pod at home. Also, the I-pod itself has such a tiny screen, I didn't like watching the videos on that. And lastly, these will be a huge distraction in any high school. Already iPods aren't allowed on some school grounds because they are such a big distraction. Students will find ways to do all sorts of crazy things with these. I had 6 games on my TI-83 after all. The videos themselves were very well made and much more interesting then some of the video's I've watched in science class before. I just don't feel that I-pods are the way to go. They seem like just a gimmick, something a principle could use in an interview. "Look! Look! We have iPods!" I focused on the just the student side. I can think of ten bad ways teachers could misuse these as well.

Take Care,
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Non-science P13

1. I think using video iPods is a really inspired way to make information accessible to the masses. Since it's so likely that most of the young target audience has this latest technology at their fingertips, the use of videos applies really well to them. Additionally, the videos were short so it was easy to stay focused.

   2. The videos have definitely affected my understanding of genetics. Using quick bursts of information made it easy for me to retain much of what I saw and heard, since I wasn't overwhelmed with information.

   3. I think the little videos increased my interest in genetics in general, because the brevity of the videos left me with so many questions about the information that wasn't fully explained. It

prompted me to think more about potential answers to those questions too and made me actually think about science when science has usually been completely uninteresting to me.

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Non-science P14

Dr. Gallo,
I watched the Science of Scent video this week. I liked how this was a new option and very portable which is good for when I had a few minutes in between classes. I like videos in general because it is much more visual. This one pretty cool but I don't feel like I took away as much info with the video. The videos on my iPod don't seem like they relate to genetics as much but maybe I just didn't understand. I didn't see how bees make honey and a woman being related to Einstein was influential to genetics. Some of them were almost too short and maybe that is why they didn't seem to relate. I don't think I am any more interested in studying the field further in school but now I can see that it is important for this field to be explored in general.

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Science P9

Hey Dr. Gallo,
what a heartbreaker this weekend. In regards to the questions for the iPod learning:
1) I enjoyed the iPod video experience. It was definitely a new teaching tool for me, which made it more fun. I also enjoyed the fact that I could sit down and watch one or two small clips at a time. I think it would be really cool if "weekly educational videos" were available on iTunes, like the weekly top songs, or even if they were available on the UF genetics site. It would be a really neat way for people to stay up to date on what's going on in the scientific world.
2) The videos haven't really affected my understanding of genetics, but I did enjoy the videos that gave a more personal view to the research and made the scientists seem more like real people.
3) The videos definitely piqued my interest in a couple of

different specific fields that I didn't know much about before. I was really interested to hear about the FIV/HIV link and the research being done with both viruses to try and find a vaccine, especially because I work at the humane society where we deal with FIV a lot.
I hope that's helpful for the iPod learning research. Have a good trip!
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Non-science P3

I've never used a video iPod before, just a Nano, but I actually really enjoyed watching the videos on it. It was really convenient to be able to bring the iPod anywhere and watch the videos. I went out of town this weekend and I didn't have to worry about having internet access or a computer, I just had to bring the iPod. I also like how watching the videos on an iPod combines videos about new and exciting technologies with a new technology.

I watched the videos on scent and the ones on the fat gene. I learned a lot of interesting things that I didn't know and would like to learn more about. I didn't know that there was a certain gene that created a hormone that made us feel full and that many obese people don't have a functional copy of that gene. I always thought the fact that many overweight parents have overweight children was because of lifestyle choices, but now I know that if could actually have been passed down from parents to offspring. I also thought the study that was done with the roses and putting unscented vs. scented on people's chairs was really interesting. I wasn't aware just how much scent affects our brains

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Science P6

Honors Seeds of Change Weekly Reflections

I thought it was a very a very interesting way to watch videos. It was more appealing to watch the videos because instead of being on a computer or television, they were available on an iPod video. For me especially, since I do not have an iPod or iPod

video myself, I thought it was much better to have the videos on the iPod video. It was portable, so I could watch them basically anywhere. I am not sure, however, if the videos would have the same appeal for students who already own their own iPods because much of the “newness” factor would be gone for them.
Most of the videos I viewed affected my understanding of genetics very little. Most of them were quite short. This was both helpful and unhelpful. It was helpful because it kept the videos from becoming boring. On the other hand, though, I thought many of the videos were too short to give adequate information. The videos would end just when I thought they were finally moving on from background information to giving actual interesting data that related to the topic. Thus, while I gained a little information in the field of genetics, I felt there was much more that I was not learning.
The videos on the iPods have not really influenced my interest in the field of genetics because I already have a rather strong interest in the area. I could, however, possibly see them inciting interest in students who may not have heard very much about the topic beforehand. Some of the videos might show students how the field of genetics relates to their everyday lives rather than being some obscure branch of science with little practical value. This could cause them to want to find out more about the field and even lead to an interest in genetics related careers.
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Non-science P1

Dr. Gallo,

One of the more interesting things that I I’ve learned from last weeks lectures were the specific ways in which herbicides and herbicide tolerant crops reacted to one another. I had no idea that Roundup inhibited 5-enolpyruyl-shikimate-3-phosphate synthase (cool word I will start using) preventing the weed or non-genetically modified plant from making certain amino acids or that it was so complex to engineer roundup tolerant crops. I think it’s wonderful that we currently have the technological know how to be able to such things that can help feed the world’s hungry and though I am “okay” with the use of genetically modified crops, I think there needs to be more safeguards. I think companies, especially big agro corporations, can sometimes be too eager to promote a product or may place profits above consumer safety, rushing or even worse hiding research about the safety of their products for fear that their product will be rejected. I think this is one of the reasons some people are so against genetically modified crops. This coupled with the fear that the EPA, USDA, DEA, and other government food regulatory departments are headed up by former agro/chemical/energy corporate leaders really makes people question the safety of these crops. I think the only way in which the American public would be more

receptive of genetically modified crops is if the credibility and independent nature of these regulatory agencies were restored.

As far as my experience with the iPod, it's been good. After showing it to my mom and letting her fiddle around with it, she agreed with me in that it can be a useful tool and that if I wanted to I could get one myself after the assignment is over. Before she was adamantly opposed to either purchasing one or me going out and buying one with my own money, citing research she's read about how those who own iPods tend to listen to them for long periods of time causing hearing loss. There is some truth to that as I have realized I have slightly better hearing than most of my friends who own iPods. Just coincidence? I don't know. Anyways, the videos have changed my perception of genetics from dull to kind of interesting. Though I felt the videos to be too short for me to gain any depth into genetics, I think the short and slightly animated nature of the videos will help attract grade school students to the subject of genetics. I think it would be great to incorporate the iPod into my group's lesson plans.

Have a great trip, wherever you're going!

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Science P12

You've reviewed a series of science education videos on the iPods. Now answer the following questions:

1. What did you think of your experience in general?
I thought that the experience was pretty cool just due to the fact that we got to even check out iPods. iPods are pretty expensive, and even though I already own a video iPod, I thought it was a cool idea. I especially thought it was nice that students could put their own songs onto the iPods. All of the videos I watched on the iPod were interesting and made slightly more interesting because I was watching them on an iPod. It was kind of nice to be riding on the bus to or from school and watching videos at the same time. Usually, I would either listen to music, read, or stare out of the window.

2. Have the videos viewed on the iPods affected your understanding of genetics? (Explain your answer.)
Watching the videos has helped me understand a little bit more about genetics, but I personally believe that in-class videos would be more effective. The videos on the iPods were interesting and informative, but they were incredibly short. At the end of each video I would find myself thinking, "It's over already? But they haven't even explained so-and-so yet!" I feel like the videos were not long enough to significantly affect my understanding of genetics. They were only long enough to briefly introduce me to certain aspects of genetics.

3. How have the videos and the iPods influenced your interest in the field of genetics?
The videos on the iPods have influenced my interest in the field of genetics in a positive way.

Since the videos were so short, I watched a lot more of than I would have watched otherwise, and therefore received a broader view of many of the different subfields of genetics. I never really knew that there were so many subfields of genetics, and the videos on the iPods made me more interested in finding out about each of the represented subfields.

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Non-science P4

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AGR2332
Self-Regulation 6

Reflective Journal Questions on iPod Learning:

1. In general, viewing these educational videos on the iPod was a new and interesting experience for me. I never considered how something such as an iPod could be used as a transportable learning tool. I did think, however, that the videos were too short to provide students with any substantial learning advances, but I do think that watching some of these videos would be a good way to introduce students to the wide range of information and research that is going on concerning biotechnology. Although short, I found many of the videos to be quite interesting, and they told me something that I didn't know before. (Such as the fact that termites may be able to help us discover a more effective way to create ethanol)

2. I don't think I would say that the videos affected my *understanding* of genetics, but I do believe they increased my *interest* in genetics. I say this because the videos were too short, and not overly informative in giving me direct background information about genetics, but much of the information presented was something new that I had not heard before. As a result, I became interested in these topics, and wanted to learn more about them. The videos seem to be good "previews" for future learning.

3. The videos and I Pods have influenced my interest in the field of genetics by presenting me with these videos on a portable source. The short videos give me something to think about and maybe do a little research on. They definitely spark my interest on the wide range of genetic projects presented. They are good teasers, and could probably be used to get students interested and give them a preview for the next day's topic and/or lecture.

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Science P7

I had a positive experience with the videos. They were a little
too and a little too introductory, but I enjoyed them because I

found it interesting to see how these higher level science topics could be presented in such a way to make them interesting to any uneducated person. The bees videos did not do much to increase my understanding of genetics, however, it did much more to increase my interest in the need for genetic engineering. I found the subject matter of the bees videos to be entertaining because bees really do have such a huge impact on the agriculture of the world. I found it interesting to see how bees mate, create hives, and produce honey. Also, these videos introduce the fact that genetic engineering is involved with these bees, most importantly in figuring out a way to stop colony collapse. I know that understanding the techniques by which these lesson videos were created will do very much to make my group's lesson plan as interesting as possible. For example, one of the videos that taught about termites compared the termite's hunger for food to our hunger for candy bars. This technique causes the viewer to feel a pleasure experience by thinking of chocolate and then pair that pleasurable experience to learning more about termite genetics. A good introductory lesson plan doesn't just throw a bunch of new information at the audience. It presents a topic that the student already finds enjoyable and pairs that with topic which the lesson will teach.

I'm sorry you won't be able to be in class next week. I hope you enjoy your time off.

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Non-science P8

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Assignment 1

9/29/07

I watched several of the videos on the iPod and I personally thought that it was a really cool way to get people to learn and care about science topics. However, I think that it's a little too optimistic to say that the videos I watched were able to seriously impact my understanding of

or interest in genetics. I think that they may have a greater impact on younger students who are more interested in scientific fields as a career.

In terms of the information put forth by the lectures this week, I was personally very excited to finally understand the actual process behind Bt engineered crops. This week has really served as the culmination of all the previous lectures and now I feel that I can enter the overall debate on bioengineering with enough knowledge to actually contribute. Specifically, I would like to continue the debate which took place in class on Friday as to whether the death of a non-target such as Monarch butterflies outweighs the benefits of Bt crops. It's true that the tests were not conducted properly and even if they were, Bt is still no more deadly to non-targets than is pesticide. However, I would really like to look at the idea which was put forward that bioengineered crops are saving "hundreds of starving kids in Africa." This statement really bothered me and I would just like to briefly say that such a skewed and simplified view of that continent and the international and domestic structures of power which are at the root of hunger and suffering there is incorrect and moreover, potentially harmful to a serious debate about Bt crops. I fully believe that Bt crops will be able to help poor rural farmers in many countries throughout Africa to improve yields and possibly their relative economic positions but an opinion such as the one above shows a lack of understanding which has the potential to undermine the public's comprehension of and support for bioengineering.

Non-science P10

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AGR 2332
Week 6

1.) I enjoyed my experience viewing the videos on the iPod. The videos and knowledge are so accessible. No matter where I am, I can click on one of the videos and learn something new.

2.) The videos have affected my understanding of genetics in a positive way. The videos are short and to the point. I liked how they gave real world examples. It helped me to apply what we have learned to the world around me.
3.) The videos have heightened my interest in genetics. Again, they made genetics seem more practical to the world around us. I enjoyed watching the videos.

Non-science P2

Self-Regulation #6 (Week of 10/01/07)

I found the video iPod to be a useful learning tool. The videos were nice and short, so I did not have to worry about losing interest in them. However, because of the length, I found that there was not all that much information to learn from each video. Of course, that same information that I learned from the videos would have been much less interesting if I had to read it out of a textbook. I find reading out of science textbooks one of the least enjoyable school experiences, considering the time it takes to read and the way that the material is presented. Therefore, putting that same information in short videos was much more enjoyable for me. Because it was more enjoyable, I found myself more interested in the material, and believe I am more inclined to remember what I saw.

Concerning my understanding of genetics, I realized that there is a wide range of topics that can fall under 'genetics.' It seems that any field can be viewed from a genetic perspective, so to speak. Everything from bees to the Queen of Sheba was covered in the videos. There is hardly an aspect of life in which genetics could not get involved.

My interest in genetics was increased in a number of ways. First, like I have already said, watching the videos was much more interesting and understandable than reading a textbook. Additionally, I found the 'genetic marker' videos to be particularly interesting, in that they related more to history and society. Being a history major, it is easy to understand why those sparked my interest a little more than the other videos. Genetics was placed in a context that I was familiar with and already interested in.

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Science P5

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For this week, we were required to watch five videos given to us on our iPods. These videos were very short, yet were still effective in relaying important information. My favorite video was "The eyes have it," which discussed the narrator's experience in a foreign country in which females were to only show their eyes. Although this video did not focus on genetics as much as it did culture and different ways of life, I still found it very interesting. In addition, I also enjoyed

the video exploring the origins of life out of Africa. The only problem with this video was its brevity. I would have liked it more if it had gone into more detail.

Although these videos were very interesting, I thought that most of them were perhaps too short to fully convey enough information regarding genetics. With the exception of the couple videos dealing with genetic diseases and ways of curing them, most of the videos did not include enough information regarding genetics. Because of this, and the fact that I've taken numerous biology and genetics classes in the past, I did not learn too much information from the videos. Instead, they helped to reinforce much of the information that I had already learned.

I thought the genetics videos were extremely interesting. Most of the videos quickly caught my attention, which is necessary in any field of education. Because the of the many topics covered in all the videos, including medicine and the origin of humans, I think that most people would be interested in watching them, even if they are not interested in majoring in a science field.

In addition to watching the videos, we were asked what the importance of monarch butterflies were to our ecosystem. Most all butterflies are important in pollination, much like bees. They transfer pollen from flower to flower, resulting in plant reproduction. In addition, they are good indicators of the quality of a specific ecosystem (Bailowitz and Sitter).

Lastly, I would like to briefly comment on last week's lectures. I always look forward to guest speakers in this class, and this week was no exception. I thought that the lecture focusing on weeds was most interesting. Before this lecture, I did not know what defined a weed, nor did I know that anything could be weeds, including flowers. Lastly I found it very interesting that what one person thinks is a weed, for example a flower, others may not, as you stated in your example of killing what you had thought was a weed, but to another was a beautiful flower.

APPENDIX G
REFLECTIVE JOURNAL ENTRIES FOR WEEK 2
10-8-07

Science P5

Regarding the use of iPods in delivering information to students, I think it is very effective for a number of reasons. First of all, it offers an alternative to the standard lectures in class. In addition, students are able to learn at their own pace. Instead of being required to learn something by a certain date or having assigned homework, this method allows students to learn at a pace that best suits them. Because of this, and the fact that the videos were already interesting to begin with, I think this method is one of the most effective ways to deliver information to students of most ages, especially high-schoolers.

Although the benefits of this method are numerous, there are also some drawbacks, the most obvious being the high expense. Most likely, most high schools will lack the sufficient funds to utilize this type of teaching method. In addition, there are some students who will not respond well to this type of learning method. All students learn differently. Some are auditory learners, some visual, and some "hands-on." Although I would think the use of iPods would captivate most high school students, there is a chance that some would not respond well to these teaching methods.

As stated earlier, I think this method is very effective in delivering information to high school students. In today's society, iPods have become a "trend." Everyone has them, and everyone loves them. I think that just the fact that iPods are being used would captivate the high school students' attention. In addition, it is an alternative to the often tedious lectures and hour long note taking sessions endured by students. Lastly, students are able to learn at their own pace, as stated previously.

I think that the use of iPods would most appeal to high school students. Most high school students already have iPods and because of this would look forward to using them to learn.

In regards to last week's lectures, I found most of them interesting. In high school, I learned a great deal about viruses and how they can kill pretty much anything. However, I didn't learn how they could be stopped. Previously, I had thought there was pretty much nothing humans could do to prevent or stop the spread of viruses, except wait it out. Because of this, I found the lectures very interesting.

I did however, miss the weekly guest lectures. I look forward to each guest speaker, and because there was none this week, I was a little disappointed, but I'm looking forward a great one next week.

Non-science P8

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Assignment 1

10/14/07

I think that the video iPods are a very effective delivery system and very easily facilitate student learning. The videos on the iPods are very clear and easy to understand and if they were on subjects that I was more interested in than genetics, I think that my learning experience with the iPod would be a very positive one. One of the major drawbacks that I can think of is that when used in a high school classroom the fact that the iPods are so personal would provide an opportunity for many students to try to do something else or just play with the iPod instead of their assignment. Granted this is also true of any focused readings or other personalized assignments which are meant to be done in class but I think that the iPods bring with them a greater temptation to use them for something other than what they are meant for. This being said, some of the benefits that I foresee include the students being excited just based off the fact that they get to handle such cool technology (I kind of was). Also, since many kids these days spend hours and hours on You Tube watching videos of a similar length to those on the iPods, they might be more inclined to pay attention to them than they would be to a longer movie. Overall, if the videos are specific to the student's interests, I think that the iPods would be a very useful method of delivery.

Non-science P10

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AGR 2332
Week 7

1. Do you think this delivery method contributes to student learning?
   Why or why not?

I think that this delivery method does contribute to student learning. It provides a quick and easy method for learning. It does not require a quiet study atmosphere or a library. A student can spend a couple minutes here and there learning while on the bus or on the go.

2. What are the drawbacks of using this type of technology in education?

One of the drawbacks of using this type of technology is that not everyone has an iPod or the capability to view the videos. This raises a financial issue for the school and for the student. There is also little accountability as to whether the students are actually viewing the videos or not.

3. What are the benefits of using this type of technology in education?

There are many benefits to using this type of technology. It provides an easy and convenient way for students to learn. There is very little time commitment, and the short videos keep the viewers attention.

Non-science P4

Reflective Journal Questions
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1. Do you think this delivery method contributes to student learning? Why or why not?

I think this method definitely contributes to student learning by getting them interested in various subjects by presenting material in a different manner. It can also reinforce what the students learned in class that day by applying the information they learned in a video, giving it real-life meaning and applications. These videos can also prepare students for the next day's material by giving them a background on the topic material.

2. What are the drawbacks of using this type of technology in education?

One major drawback to using this type of technology in education is that it could possibly result in decreased teacher-student and student-student interaction.

Another drawback that could occur has to do with using this technology in education has to do with some downfalls of technology. Technology isn't always reliable. There can be problems with students' iPods. Also teachers could be spending too much time trying to help students with iPod issues, wasting teaching time in the classroom. These concerns are probably not that big of a problem for high school/college students, but rather students in elementary/middle school who don't have as much experience with technology.

2.3. What are the benefits of using this type of technology in education?

One benefit of using this type of technology in education is teaching students not only how to use technology, but how to use technology for educational purposes. Perhaps they will become more inclined to put more educational multimedia in the form of videos or podcasts on their iPods, which will increase their learning.

Another benefit of using this type of technology is that perhaps it may present educational materials to students in a more entertaining way. Some students may be more apt to pay attention to a video on their IPod than their teacher.

Another benefit of this technology is that instead of showing videos in class, students can view them at home, allowing for more teaching time in the classroom.

Yet another benefit of this type of technology is that it is easily portable. Students can view these videos on the ride home from school, or pretty much wherever they want. Therefore, students will be more likely to watch them.

Non-science P2

Self-Regulation #7 (week of 10/08/07)

I think the iPod does contribute to student learning. Students will probably be more open to learning and be put off less by education if it is presented in a 'fun' way, like on an iPod. Many high school students might reconsider their stereotypical views on science as a subject meant solely for old men in lab coats.

A drawback to using an iPod as an educational tool is the expense. I do not know how many public schools want to spend money on iPods for all of their students. Additionally, the iPods could be damaged if dropped, or they could be stolen, considering how popular they are. The videos on the iPod were relatively short and did not provide very in depth information on the different topics that they presented. However, as the iPod is not meant to replace a teacher, this is not that much of a problem, as it should only serve to complement what is being learned in the classroom.

There are many benefits to using an iPod as an educational device. I found the videos much more interesting than what I might have read in a textbook on the exact same subject. Also, the shortness of the videos could be seen as beneficial (in addition to being a drawback). It is beneficial because many students have fairly short attention spans, and so having a video only a couple minutes long would keep their attention as well as preventing them from becoming overwhelmed with information.

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Science P12

Consider your experience viewing educational videos on mobile iPod devices. Now answer the following questions:

1. Do you think this delivery method contributes to student learning? Why or why not?
I think that this method does not contribute to student learning as much as it could, simply because the videos were extremely short and seemed to be cut off in the middle. The videos would be more effective if they were longer, but that would probably take up too space on a device like an iPod.

2. What are the drawbacks of using this type of technology in education?
As I said above, the videos on the iPod were too short to be of substantial educational value. Using this type of technology will not allow students to learn as much as they would have while watching an in-class video.

3. What are the benefits of using this type of technology in education?
The benefits of using this type of technology is that it makes the material more interesting to students, and they are more likely to pay attention to what they are watching. Students can also watch the videos anywhere instead of just in the classroom, giving them the opportunity to re-watch any video they did not completely understand or just one that they would like to see again.

Non-science P11

1. Do you think this delivery method contributes to student learning?
Why or why not?
Possibly. There would need to be empirical evidence to test this for me to be convinced though. I could set one up right now. Give the students an iPod with videos. The students should be random with about 30 from each grade and or skill level you would want to give iPods to, and also from more then one school. Some don't tell there will be a quiz at the end of the week, some you do. Also have a control for traditional (loosely defined) teaching methods. Tell me the results.
I have found the teachers and their unions are pretty much opposed to empirical research to determine the best teaching methods.
2 and 3 will answer my why and why not.

2. What are the drawbacks of using this type of technology in education?
For students there are many reasons why this doesn't (or might not) work. First, high school students are lazy. Most will not watch the video, even the honors and AP ones. Most barely do graded homework assignments and papers, much less on time. One person will watch it, and maybe tell other students about it. There better be a pop quiz afterwards to make sure they watch it.
They are also untrustworthy. If you give out 20 iPods, 10 will be lost, stolen, or sold. 5 more will be broken.
Even if they are angels, if they do watch the videos, I doubt these are more effective then normal teaching methods.
Also they don’t want to worry about losing it/it being stolen. 4 will be in their locker/room from the time they get it until they return it.
1 will watch the movies, say that’s cool and not remember it.

For teachers it is control and extra work. None will want the responsibility of overseeing 20+ i-pods. It will take more time to give out the iPods, explain them, and then collect them back, put videos on them, make sure everyone is watching them.

For administrators it is the cost. 250 bucks each. That’s like 3 textbooks. That’s 3 for a new computer. That’s another custodian a week. And for a gimmick? That is not worth it.

3. What are the benefits of using this type of technology in education?

For students it is convenience and learning more on their own time.

For teachers it is possibly teaching more effectively, a free iPod, and any incentives they get form the admin the use them.

For Administrators it is being able to say, "Look we're using iPods! We are on the cutting edge of technology." A.k.a., only for private and magnet schools.

I really don't think they are worth the cost.
Take Care,
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Non-science P13

1. Do you think this delivery method contributes to student learning? Why or why not?

   I do believe that the use of video iPods contributes tremendously to student learning because the iPods present the target information in a way that is very accessible to the target age group. It would be very difficult to locate a student from age 16 to 19 that does not know how to operate a video iPod, even if that student does not own one himself.

   2. What are the drawbacks of using this type of technology in education?

   One drawback of using such a device as a method of conveying information is that when you assign the students the task of watching a video on the iPod, you have to trust that the student will actually do the assignment, as opposed to when you screen the video in class and they have nothing else to do but pay attention. Additionally, using the video iPods removes the personal and human aspects of teaching the subject matter, since when the students are charged with watching the videos, there is usually no discussion period immediately after for the teacher to clarify certain points.

   3. What are the benefits of using this type of technology in education?

Students are much more likely to respond well to using the technology due to the fact that it's in a form that's very familiar to them. Additionally, it's easier to handle having to watch videos on the iPod because of that fact that since each student has their own individual unit, they can complete the assignments on their own schedules and/or on the go, which is a benefit for high achievers who have busy schedules.

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Science P9

1) I think the iPod videos definitely contribute to student learning. They are on par with the way that our generation is used to accessing information, and their short format fits our immediate gratification lifestyle. If students enjoy the way they learn and can access that learning on their time frame it definitely helps the learning process.
2) The drawbacks are that unmotivated students might not watch the videos. Also, although the short format makes it easier for students to watch them at their convenience, it does not allow any significant amount of material to be conveyed.
3) The benefits are that it motivates students to learn on their own time as described in question one. If videos are available on the internet, they can also contribute to education of the general public.
Hope you had a good weekend :)
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Non-science P14

Dr. Gallo,
I think that using this technology might be good for people with less interest in the subject because it is more engaging but someone more knowledgeable might not find this productive. Some of the drawbacks would be that students who are not interested in technology, while they may be the minority, would be disengaged and dislike it on principle rather than material. While this is good because like I said a majority of kids will find this as a useful option. I mean you can even listen in the car which is great for our busy schedules.

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Non-science P1

Hi Dr. Gallo!

This week's discussion on the effects of virus resistant crops on the environment was very interesting. I think some of the points mentioned in Friday's discussion really emphasized what I've been taking about in previous reflections. Although plant biotechnology is "cool" and can help solve us the problems of food shortages and crop destructions by diseases, we really need to study the effects they have on not just the target insect, virus, or fungi, etc., but also the effects on non-target objects. In the paper entitled, "Toxins in transgenic crop byproducts may affect headwater stream ecosystems," Dr. Rosi-Marshall pointed out that many corn fields in the Midwest are located near streams and that corn pollen often times drift and collect on the surface of the streams. She observed in her study that at high enough concentrations of Bt endotoxins from corn pollen, can affects the wildlife in the stream ecosystem in a negative manner. So we must be careful with how we use these genetically altered crops.

As for the video iPods…it can contribute to student learning only if it is used in the right way. Because the video iPods were first and foremost made for music and entertainment, I think it is very easy for students to forget about the educational aspect of it. Most students would rather listen to music or watch movie clips than scientific video clips. It is a very cool device, but I think showing the video clips on the classroom projector or tv would be more cost effective and would most likely yield the same result. The argument that students can take the videos with them is not a very good argument as I doubt many students will watch scientific video clips while walking or jogging.

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Non-science P3

I think that the usage of video iPods to watch educational videos contributes to student learning because students are more apt to pay attention and actually watch the videos when they can do it on their own time and use the technology of a personal video device. One big advantage of this method is that it takes a not-so-exciting activity like an educational video, which students often use as an opportunity to sleep or pass notes, and makes it more hands on. With a video iPod sitting in front of them, students are more likely to actually pay attention and take

interest in what they're watching. It also makes things more convenient in that students are able to watch the videos whenever and wherever. One drawback to using this method is that video iPods are expensive to obtain and also to replace is something were to happen to them while in the students' hands. Also, while watching videos on an iPod is more hands on and involved then just watching the television in a classroom, it's still no replacement for other activities that engage students while in the classroom. I think using the iPods to watch videos would be most successful is the students were instructed to have certain videos watched by a particular date and then a discussion followed in the classroom.

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Science P6

I think this delivery method does contribute to student learning. Delivery method is important in everything because it affects whether or not students utilize the material and also whether or not they pay attention to and actually try to comprehend it. The drawbacks of this method would be that not every student has a video iPod. This creates potential problems for those who may not be able to afford or simply do not care to have such a device, as these students would be unable to participate. Another problem would be that students might not bother to watch the videos if they are on iPods. A video screen in the classroom ensures that students are at least present physically, if not mentally, while videos are being played. A student might be tempted, however, to watch music videos rather than schoolwork videos and thus, not learn the specified material. Some advantages to the IPod method would be that students could watch the videos on their own time. If a student is absent when a video is presented, they could watch it at home. Students might also pay more attention to the videos because if they get bored with the video, they could pause and resume at their leisure. There would also be the 'coolness' factor of watching a video on an iPod rather than a TV. Teachers would also have more utilizable class time. Instead of being forced to waste thirty minutes, or however long the video lasts, they could assign students to watch the video for homework and use class time to actually explain and teach the concepts. I think there are mostly benefits for utilizing this technology in schools

as long as problems, such as not everyone having an iPod are solved. As demonstrated by this class, however, this is a solvable problem, so this technology has the potential to succeed in the future. I know some places, not even schools, are already utilizing video iPod technologies. My dad, a dentist, now has the option to download and watch his continuing education videos for dentistry on a video iPod. Depending on how the success of this goes in the professional world, schools might follow this lead.

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Science P7

The iPod delivery method of study can contribute to learning, but only in specific situations. The iPod would best be utilized if the videos were used to visualize difficult concepts and procedures. A teacher uses the iPod to teach written lecture material because the student would get bored very easily. If a student doesn't enjoy watching a teacher in class, I don't see how this student could be more interested watching the teacher on a really small video screen. In my opinion, the videos should be made to serve as an AID to homework assignments. This would force the student to watch the video so that the assignment could be completed and it would also make the student more interested in completing the assignment. Also, if recordings of the lecture were made, it would be great if those recordings could be viewed on the iPod during study. Difficult materials taught in class could be reviewed and students can take as much time as they want trying to understand what they see.

A drawback of using this technology is that it might be difficult for the videos to be put on the iPod. All students would have to bring their iPod's to their teacher whenever new videos needed to be put on. If a student could put the videos on from his own computer, that's fine, but then why can't he just watch those videos from his own computer in the first place.

A benefit of this device is that the student can use the iPod virtually whenever he or she wants outside of class. The ear phones allow the student to listen in any environment, noisy or quiet. Also, even without the video, this iPod could be very beneficial in a language class. The student would get great experience from the iPod if he was required to listen to and watch

videos in another language.

I don't think this technology is good beyond the high school level. I'm sure any college student would much rather use a laptop.

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APPENDIX H
REFLECTIVE JOURNAL FOR WEEK 3
10/15/08

Non-science P8

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Assignment 1

10/21/07

The first thing that came to mind would be giving iPods to all the students in class (the class will have to be relatively small for this to work). There would be somewhere between 4 or 5 videos on each iPod which deal with a different topic and you could either let each individual student or the teacher pick which video each student will watch (allow I think that the former option would allow for greater engagement in the activity) . After the students watch the video of their, or the teacher's, choosing they would get together with other students in the class who watched the same video. They would discuss what they learned from the video and maybe answer some questions on the video as a group. Time willing, they may even be able to put together a very brief presentation for their classmates on just what their specific video dealt with.

The reason that mobile learning devices like iPods would be so useful in this scenario is that they would allow for each of the students to be able to pick which subject he or she would like to learn and perhaps teach their fellow students about. Hopefully, the availability of such a choice would translate into an increased level of interest on the subject and, as a result, encourage learning to a greater degree than a video that the teacher chooses and has the entire class watch together.

Science P12

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Consider the lesson plan assignment and the information you received concerning the application activity. Now answer the following questions:

1. Describe an application activity that involves mobile learning devices like iPods.

Another application activity involving mobile learning devices is an activity using tape players. If an important lecture is to be heard, having a student listen to the lecture on a tape player may make it easier for them to learn it. Students will be able to not only listen to it anytime, but they will also be able to replay it as many times as they want, and possibly record their own thoughts on the tape player after the lecture is finished.

2. Explain how the mobile devices encourage student learning and engagement in the activity.

Mobile devices encourage student learning and engagement mainly because the way that the student is receiving the lesson is new and exciting. Using a mobile device to learn is easy because the learning can take place anywhere, not just in the classroom. Students can also reinforce the material by watching or listening to it as many times as necessary.

Non-science P11

One of my favorite websites is http://www.americanrhetoric.com/. It is an online database of famous speeches (both in history and fiction). So now we have an iPod filled with about 200 famous speeches throughout history. These could be used in either history or English classes. In history class, we would learn about WW II. Then as we wrap up learning about the war, everyone in the class must listen to General Douglas Macarthur's Farewell Address to Congress, one of the greatest speeches ever. This would be followed up by an essay or at least a reaction.

I never understood how teachers could make history boring, but they can, and do. It is terrible and something like this could bring history alive for students. We all learn about Martin Luther's "I have a dream" speech, but I would bet that 99% of high schoolers graduating have never seen the whole transcript or even more than two paragraphs of it, much less have heard the full thing. You want kids to know history, make them hear it through the words of people who made history. Now this could be done in class or through a video, but this is one of the few times I would say iPods would be more effective. However they will only be effective if the write up is worth a significant portion of their grade.

Take Care,
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Non-science P13

1. Describe an application activity that involves mobile learning devices like iPods.

An obvious activity that involves iPod-type devices is uploading all the videos concerning the topic at hand to the device and having the students watch the videos on the iPods instead of on a

projector or a TV monitor. For an educator searching for off-the-wall applications, one could also compose an original song about the target information and store that on the iPod, then have the students learn the song and sing it together or something.

2. Explain how the mobile devices encourage student learning and engagement in the activity.

Presenting the information on iPods makes said information seem much more familiar and approachable, since the students are receiving their education from a common medium that they understand. Psychologically, the more familiar and comfortable the conditions are under which students learn, the more retention is shown over an extended period of time. Additionally, students may be more willing to engage in using the iPods because it's more fun to scroll through the list of videos and pick one than it is to watch the video that the teacher has pre-selected. With the iPods, each student can customize his or her education.

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Non-science P10

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AGR 2332
Self Regulation

1.) Describe an application activity that involves mobile learning devices like iPods.

2. The instructor of the class could record several short videos. These videos would contain brief statement of a problem that needs to be solved. The videos would be downloaded to a student's iPod or similar device. The students would then group up and watch their assigned problem. They would then solve the problem and present it to the class.

2.) Explain how the mobile devices encourage student learning and engagement in the activity.

The mobile devices are a cool way to get students involved. The students would be more likely to enjoy the lesson because it is coming from a video on an iPod. iPods are very trendy and exciting to most kids, and I think that they would be more interested if they could use an iPod. The attention of the students would be easier kept, and the students would stay more focused and alert.

Non-science P14

Dr. Gallo,
For an activity, we could make videos that were more interactive. They could include questions that were asked during it as a homework assignment so that the student is more engaged. Also something where the listener gets to hear part of a story and then pick the next step are entertaining. These devices encourage engagement because they are more personal than watching a video with the rest of the class. Also it could be possible to have students watch different ones so that they can be held accountable. Also it is very easy to do and most people don't have an issue carrying a small iPod around as opposed to a heavy textbook.

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Non-science P1

Hi Dr. Gallo,

In terms of an application activity for the video iPod, I thought the best one would be some sort of lab. I think a video clip that shows step by step how to conduct a lab experiment would work the best with the iPod. Giving each student control of the video clip would not only benefit the students by allowing them to work on the labs at their own individual speed, but it would also save the teacher from repeating the steps to the lab. I think using a mobile learning device like the video iPod really helps students learn the material better. They no longer have to be frustrated or embarrassed when they don’t recall something the teacher said or did because the entire lab would be on the iPod for them to review as many times as necessary. By eliminating these feelings that the student might have the device can encourage the student to continue learning and engaging in the activity. Videos don’t have to be limited to just labs, but entire lessons or lectures can be put on the iPod, so that the student can review the material anytime and anywhere they want, so that can understand the material better.

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Non-science P3

One possible application activity would be to give the students video iPods like we were given and ask them to watch a video on genetically modified crops as homework. It could be a general video on what GMOs are, or about a specific type of GMO. Either way, the students would be told that the next day in class there would be a discussion over what they thought of the video. Assigning students to watch a video on an iPod rather than read an article or pages in a textbook is more likely to encourage participation because they can just sit back and watch, taking in the information. I think that it's much easier to learn about a new topic when you have a visual, especially a video. Also, students can watch the video anywhere easily, even on the bus or at lunchtime.

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Science P7

Since my lesson plan is about environmental conservation, specifically phytoremediation, I will create an iPod activity that will work for my topic. Before I describe my activity, I would like to say that I really enjoyed your intro into this topic in class on Friday. It's always great to look at the world from a child's perspective, especially a Dr. Seuss book.

In my activity, an iPod will be given out to each student, and each iPod will have one of six possible short videos on it. Three of the videos will inform the student about the positive aspects of genetically engineered plants that clean and conserve the environment. The other three will inform the students on the negative aspects of genetic engineering on the environment. Each student will be told to defend the argument in the specific video he or she watched. Of course, only the most outspoken student will engage in this debate, but each student will be more likely to respond if there is an even larger pool of videos given out to the class. If each student was given a different video, this would work really well to engage each student in the topic because each student would have a unique topic to comment about. This would also be a great activity because the students are forced to defend the topic they are given whether they agree with it or not. This

means all of the students will be able to see the negative and the positive aspects of genetic engineering and the environment.

Non-science P4

Reflective Journal Questions
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10/21/07

Consider the lesson plan assignment and the information you received concerning the application activity. Now answer the following questions:

1. Describe an application activity that involves mobile learning devices like iPods.

An application that involves mobile learning devices like iPods is having students watch a video on their iPod relating to the day's lecture and then having them do an activity relating to the video. For example, if the students learned about ethanol creation from plants in class, the video could take them to a place where the convert corn into ethanol in a factory so that the students can actually see the process. After watching the video, the students could answer questions about the process or draw a flow chart of the process. Therefore there is not only passive learning, but active learning. Additionally, the teachers can make sure their students fully understand all of the steps it takes to create ethanol. Hopefully this exercise would not only solidify what the students learned in class, but also give them a practical application of the in-class materials.

2. Explain how the mobile devices encourage student learning and engagement in the activity.

2.The iPod encourages student learning and engagement by providing students with applicable material that they would not otherwise have the opportunity of having. For many students seeing the process will be extremely helpful so they can visualize the process or information described in lectures. The video will also give the information more meaning as the students can actually see what goes on in the factories. In addition, the iPod encourages student learning in that the video does not have to be shown in class time. Therefore, there is more time for the teacher to teach the class instead of the videos. Also, the mobile device encourages student learning in that it is learning they can conduct anywhere. They don't have to be at a desk to do it; they could watch the movie riding home or while eating lunch. Also, by showing students a real-life application in a video, they can have a greater understanding and participate more in class discussions on the topic or help in explaining it to other students or even their friends.

Non-science P2

Self-Regulation #8 (Week of 10/15/07)

As an application for iPods, students could use the iPods at home to watch videos related to the material that would be covered in class the next day. To assist in the learning of the material, the teacher could supply supplementary questions. These questions would ensure that the student

understood the material presented on the video iPod. This presentation would encourage learning, as the videos might interest the student. Additionally, when the students go to class the next day, they would have some familiarity with the material and would be better prepared to participate in class discussion and activities.

I think that car-manufacturing companies should be held more accountable for vehicles with high emissions and low mpg, like SUVs. The cost of producing such vehicles should provide an incentive to decrease their production. These increased costs would be passed on to the consumer, meaning that less of the population would be able to afford these vehicles, and demand would decrease. Additionally, I think that schools could play a more active role as well, placing more of an emphasis on environmental science. The upcoming generations would then be more environmentally friendly and have lifestyles that were less harmful to the environment than those of their parents. In the past, schools in America have often been looked to as forces of social change and reform. I believe now would be an ideal time to use the school system in such a way, as drastic changes are needed in this country, if we are to break away from the 'bigger is better' culture that currently prevails.

APPENDIX I
REFLECTIVE JOURNAL ENTRIES FOR WEEK 4
OCTOBER 22, 2007

Non-science P10

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AGR 2332
Week 10

2.1.) What are your preferences for learning? Consider the location, time, and style.

I prefer to study at night and at home. I also like to study using hard copies of information, and doing practical problems.

2.) How did viewing the videos on iPods work with or against learning preferences?

It did not exactly work with my preferences, but it did not work against them. It was very easy to learn using the iPod, no matter what learning style a student has.

Non-science P2

Self-Regulation #10 (week of 10/29/07)

Whenever I am learning or studying material, I prefer to be at home, with music on quietly as background noise. I prefer studying from my handwritten notes, as it helps me recall better what was said during class lectures and discussions. I tend to take rather extensive notes during class as a result of this preference. I like to use different colored highlighters when I am studying. This helps in a number of ways. I am able to highlight any key terms or themes, as well as color-coordinate my notes. The color-coordination helps me to draw parallels between different ideas and gain a better understanding of the 'big picture,' rather than simply memorizing facts without understanding the facts' relation to one another. I can study any time, except late at night. Anytime from midmorning to evening usually works well for me, though I prefer mornings and evenings to afternoons.

The iPods worked with my learning preference in that I was able to do it at home, where I am most comfortable. Also, I could watch the videos any time that I wanted, therefore fitting into my preference for studying during the daytime. However, as I like to read the information that I am studying, watching videos as a means of learning was not the best for me, though it still worked fairly well.

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Science P5

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Self regulation

1. All students have different learning styles. Some are visual learners, while others are auditory. Personally, I am a visual learner. This is why such devices as iPods or short movies would be most beneficial to me. Concerning location and time, I tend to learn more efficiently in the morning or mid afternoon, most likely because my brain has not yet been "worn out" throughout the course of the day. In addition, I tend to learn better in a classroom of about 20 to 30 students. I think the smaller the class is, the more beneficial to students. Outside of the classroom, I study best in my dorm or in a library. Places like coffee shops or other public places are hard for me to study because of the amount of people and noise.

2. As stated earlier, my learning style is best described as visual. I would much rather watch a short informative video such as on the iPod, than listen to a long lecture. Long lectures can often become tedious or monotonous depending on how effective the teacher is at conveying the information. Because of these reasons, the iPods suited my learning style very well. I also thought it was beneficial since I could learn at my own pace, rather than being confined to a certain time of day. Because everyone's learning styles are different, iPods might not work as well with them as they did for me. Because of this, I think a mix of lectures, readings, and visual learning (iPods, movies, etc.) would be most beneficial to all students as a whole.

Non-science P8

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Assignment 1

11/4/07

My preferences for learning in terms of location, time, and style are at my house or the library, in the afternoon, and in a textbook or any kind of written material. The iPod works with respect to the location and time aspects of my learning preferences considering it allows me to watch the videos anywhere (even in the library, which is nice) and at anytime during the day.

However, considering it’s a video based learning system, the iPod obviously doesn’t fit my most preferred learning style.

Science P12

Different students like to learn in different ways. Consider how you like to learn including the location (library, coffee shop, in a park, at home), time (morning, evening), and style (textbook, video, audio clip, web site). Now answer the following questions:

1. What are your preferences for learning? Consider the location, time, and style.
    - My preference for learning actually depends on my mood. Sometimes I'm able to concentrate fine at my apartment, but other times I'll be too restless and get too easily distracted to study there. When that happens, I have to go somewhere like the library, or a coffee shop. In actuality, though, when I'm in that kind of mood it doesn't really matter where I study, as long as it's somewhere different from my room or my apartment. My best study times are anytime except the afternoon. I usually read the textbook when I study and take my own notes as I go.
2. How did viewing the videos on iPods work with or against learning preferences?
    - The viewing on the iPods did not really work for or against my learning preferences. This is probably because there wasn't really anything to memorize on the iPod videos. If there was, however, it would work against my learning preferences because I am a very visual person, and I would forget any details of the audio on the iPods rather quickly.

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Non-science P11

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Different students like to learn in different ways. Consider how you like to learn including the location (library, coffee shop, in a park, at home), time (morning, evening), and style (textbook, video, audio clip, web site). Now answer the following questions:
1. What are your preferences for learning? Consider the location, time, and style.

I like to learn in the classroom. I like to just go to class and absorb whatever the teacher gives me. I don't like to read much outside of the classroom for class or study much. I've never

had to, I don't do much in college unless it is necessary.
If I do, It is at home either lying down on the floor or my bed. Also it will be at night after dark, unless it is a test. In that case it is the 4 hours before hand.

2. How did viewing the videos on iPods work with or against learning preferences?
It worked against my learning preferences. If the teacher wants me to watch a video, show it to me in class. That's why schools have a $1000 projector in each classroom right?
For me it was a hassle. Especially given the length of the videos. It took me 15 secs to find the video and hit play, the video wasn't much longer. Also, it wasn't interactive nor intuitive.

Non-science P13

Different students like to learn in different ways. Consider how you like to learn including the location (library, coffee shop, in a park, at home), time (morning, evening), and style (textbook, video, audio clip, web site). Now answer the following questions:

1. What are your preferences for learning? Consider the location, time, and style.

When I'm trying to learn something, I prefer a setting that I'm familiar with, such as my own desk or in a classroom, during the early afternoon, and from a textbook that I take my own notes from.

2. How did viewing the videos on iPods work with or against learning preferences?

The video iPods matched my desire to learn in my own setting and at my own time, unlike the structured setting of a class, but since the videos are so short and since they aren't in a textual form, it would be difficult for me to take efficient and effective notes on them.

Science P9

A)
1) I like to study in a library or with a group of friends, even if we're not studying the same thing. If I'm by myself I get distracted too easily. I try to study in little bits throughout the day instead of sitting down and doing it all at once, because I feel like then I have time to digest each piece before moving on to the next one. I'm a very visual learner, so videos and pictures work really well for me. I retain textbook reading pretty well also, but I sometimes get bored trying to read too much at one time.
2)The iPod videos were good for me because I could do little chunks throughout the day, and they worked well with my visual learning preferences.

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Non-science P1

Different students like to learn in different ways. Consider how you like to learn including the location (library, coffee shop, in a park, at home), time (morning, evening), and style (textbook, video, audio clip, web site). Now answer the following questions:

1. What are your preferences for learning? Consider the location, time, and style.
    - I typically prefer to learn, whether it is through doing homework or reviewing notes, in the morning when my mind is fresh and in the comfort of my apartment, where there are usually no distractions. The exception to this is if it is a complex subject, then I like to work in a small group at the library or a local coffee shop. In addition I am a visual learner so I learn quickest when I can see what I am learning through graphs, videos, pictures, etc.
2. How did viewing the videos on iPods work with or against learning preferences?
    - Though the videos on the iPods were interesting and they did appeal to me since I’m a visual learner, for me they were too short for me to learn much about the scientific topics. So in essence they neither really helped nor hindered learning preferences.

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Science P6

Seeds of Change Reflection email

I prefer to learn in any environment that is quiet and relatively free of distractions. I don't really think that I have a specific preference for any one place, but, in order to meet these requirements, I usually end up studying and trying to learn material in my room. I think that I learn better in the morning. Of course, it can't be too early, but after I'm up and going in the morning, I'm better able to learn than in the afternoons or evening. I prefer to learn usually by reading about something or having something explained to me. The video IPods gave me the flexibility to learn where and when I wanted. I watch the videos in my room at whatever time I so chose. They did not, however, allow me to read the information. Most of it was explained pretty thoroughly, but I would have liked to be able to read it and hear it at the same time.

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Science P7

Questions A

1) I prefer to learn in a relaxed quiet environment. If it's in the library, I need to be sitting on a really comfortable chair. If it outside, I prefer to be lying down in the grass. I have no preference for the time of studying. I study whenever I have time. However, I'm usually more likely to study earlier in the day. My favored style of learning is from the textbook.

2) The iPod works in favor of learning in my preferred environment and at the time I desire, but the iPod is not my preferred style of learning. If I did have an iPod, and the material on it was beneficial to me, I would use it along with my textbook and notes.

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Non-science P4

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Different students like to learn in different ways. Consider how you like to learn including the location (library, coffee shop, in a park, at home), time (morning, evening), and style (textbook, video, audio clip, web site). Now answer the following questions:

2. What are your preferences for learning? Consider the location, time, and style.

How did viewing the videos on iPods work with or against learning preferences?

I prefer to do homework and learn in a quiet place, usually the library mid-day to late afternoon. I work best when I am not in the same environment for too long of a time. I also prefer learning from video, audio, or websites as opposed to textbooks. I find that reading for too long of a time causes me to lose interest in the material sometimes. Websites and video are probably my preferred means of learning. I would say that iPods work with my learning preferences because not only can I use it in a variety of places, I can use it at any time of the day. I would also prefer watching the videos or listening to audio on the iPod as opposed to reading from a textbook.

APPENDIX J
REFLECTIVE JOURNAL ENTRIES FOR WEEK 5
OCTOBER 29, 2007

Non-science P13

Consider what you've learned about developing lesson plans. Now answer the following questions:

1. What would be your recommendations to science teachers interested in using mobile learning devices like iPods to teach genetics?

I would have to say that the teachers should use videos on the iPods that are longer in length and contain more educational material than the videos on our iPods, because those short videos offer very little information and present a useless resource.

2. What would be your recommendations to science teachers interested in using educational videos to teach genetics?

Clearly educational videos are a very informational way to teach genetics, but a teacher runs the risk of inattentive students if the video is shown in class, since some of those students may not learn as well at that specific time. Therefore, if mobile learning devices such as video iPods are used in conjunction with educational videos, a happy medium may be reached.

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Non-science P10

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1.What would be your recommendations to science teachers interested in using mobile learning devices like iPods to teach genetics?

I would suggest using short videos that contain real life situations and people. It is much easier to learn if you can see a real example, rather than using a hypothetical example.

2.4.) What would be your recommendations to science teachers interested in using educational videos to teach genetics?

I would suggest using videos that are up to date and interesting. Videos that are older have a way of seeming boring, even if they are not. Also, I would use short videos. Often times with long videos students just zone out and don't really learn much. Again, I would also use real life examples in the videos.

Non-science P2

For teachers interested in using iPods to teach genetics, I suggest that they have supplementary questions to go with the videos, so that the students are forced to pay attention to the videos and recall the information that is presented. The students will most likely better remember the information this way. I also suggest that the videos on the iPod be short, but numerous, with each video containing a very specific topic of information, but with the whole of the videos covering a general topic. This way, the students will be able to compartmentalize the information they receive but still relate the different videos to one another. I would use the same recommendations for science teachers looking to use educational videos to teach genetics. However, if these videos are shown in the classroom, they could be longer in length, and rather than supplying questions that the students must answer individually, I believe a group discussion about the information in the video would be better.

Science P5

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3. The concept of using iPods to teach is a very innovative technique. If I were a teacher, I would make sure that the required iPod videos were interesting and appealing. If the videos are boring or monotonous, students will quickly lose interest and consequently not learn any of the information. This would make the iPods counterproductive, and a waste of money. However, if informative and appealing videos are used, such as the ones provided in our seeds of change class, the concept of using iPods is very useful. I would also make sure that the videos were not too long, since some students would lose interest after some point of time.

4. Concerning the use of visual movies for teaching, my advice remains the same. Make sure the videos are not too long, and are appealing to the students' age groups. In addition, since not all students are visual learners, I think it would be most beneficial to utilize a mix of lectures and movies. As is done in the Seeds of change class, lectures should be broken up with short movies (the class should not consist of movies alone). This way, students pay attention for the entire class period, and visual, auditory, and other students remain interested in the topic.

Last week, I showed some concern relating to not being able to find much information on my honors topic. After this, you told me that researching edible vaccines might work better. A lot of information is on the internet about this topic, which should be very beneficial to my project. I now think that I will be able to collect enough research to make my project both informative and interesting.

Non-science P8

(removed)

Science teachers interested in teaching genetics with the video iPods may want to have longer videos on the iPods than those which we watched. The shorter videos that we watched are better for students who are not very interested in what they are learning about but those students who actually have a science background and have chosen to take a genetics class are probably going to want more information than can be provided in three minute videos.

For teachers who plan on using educational videos to teach genetics, the only recommendation that I can think of would be to chose an interesting video and not necessarily test the students on the content of the video. I find that whenever I have to write notes on a video for a test or quiz which deals specifically with the video, the video seems much less interesting and I don't get to experience and understand the video quite as well. I've always believed that it would be a better learning experience overall if the students just watched the given educational video and held a class discussion afterwards as opposed to having a test on it. Also, if possible, it may be helpful if the students could view the video online. This would allow for greater flexibility in terms of the students' location and time learning preferences.

Science P12

Consider what you've learned about developing lesson plans. Now answer the following questions:

1. What would be your recommendations to science teachers interested in using mobile learning devices like iPods to teach genetics?
    - I would think that it would be a good idea only for general informative videos, and not videos with important details to memorize. Students would probably tend

to watch the iPods in a not study conducive environment, and that would make retaining detailed information hard.

2. What would be your recommendations to science teachers interested in using educational videos to teach genetics?
    - I think that educational videos work well to teach genetics, but then again, the videos should be followed up with a lecture or additional information. If the videos were put on iPods, though, it would be hard to follow them with a lecture or notes unless the notes were given beforehand.

Non-science P11

Consider what you've learned about developing lesson plans. Now answer the following questions:
1. What would be your recommendations to science teachers interested in using mobile learning devices like iPods to teach genetics?

iPods should only supplement learning. It should not be the driving force. Also if you are going to have a lot of short videos on there with specific info, have there be a little text at the end saying "to learn more watch video Y, or to move to a new topic watch video X," more interactive, more intuitive. Maybe the more info video can be a bit longer and more in depth. Also, if you want the student to retain info from the iPod, have them take a quiz at regular intervals on it. Better yet, have the videos be a quick recap of the week's lessons to help study for exams.

2. What would be your recommendations to science teachers interested in using educational videos to teach genetics?

I like the videos on the iPods. If they are going to be actual education videos intended to teach something rather than showcase something neat, have them be a bit longer. Otherwise they were well produced. I liked the nuts and bolts lab stuff, that's something you'd never see in high school. Also you could string a lot of them together and have an announcer in between ala Bill Nye. It all depends on what the teacher wants out of them.

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(removed)

Science P9

(removed)

B)
1)The mobile learning would be good to teach the human interest aspect of genetics, or expose students to interesting new research going on. I don't think it's necessarily good to teach important genetic concepts because it's hard for students to ask questions as they watch and the short format may not really be conducive to teaching the important basic concepts.
2) I think educational videos can be very valuable to teachers teaching genetics because it makes it easier to students to visualize what is happening on the molecular level. I think they work best when the teacher presents them and explains what is going on so that students have the opportunity to ask questions, or back up and watch confusing parts again.

Non-science P1

Consider what you've learned about developing lesson plans. Now answer the following questions:

1. What would be your recommendations to science teachers interested in using mobile learning devices like iPods to teach genetics?
    - My recommendations to science teachers interesting in using such devices that they are merely tools to aid them in teaching the subject, but should not be relied upon as the sole source of learning for their students. It is not a substitute for a teacher teaching in front of the classroom and doing activities to help students further understand genetics. Videos on the devices can be powerful in attracting students to the field or changing the students' perception of genetics as a boring subject. Also I feel that it is not necessary to use mobile devices like the iPods to teach genetics as simply projecting the videos through a computer connected projector is just as effective and more cost efficient.
2. What would be your recommendations to science teachers interested in using educational videos to teach genetics?
    - Educational videos can really help some students better understand complex subjects like genetics, but it is essential that they not but used as substitutes for actual teaching in the classroom. Passive activities like videos, PowerPoints, etc. can only so far in teaching genetics. However things such as hands-on activities and discussions, that engage students and allow them to learn and think about genetics is far more effective than any of those passive activities. In addition they

will be more like to recall the information in the future because of these experiences that help them learn about genetics.

Science P6

I would recommend that science teachers only use video IPods and other mobile learning devices if they have a group of relatively self-motivated students. It takes self-discipline and motivation to make one watch educational videos for a class assignment. Whereas videos in a classroom force students to at least somewhat watch the video, the iPod ones leave it completely up to the students to watch them. Thus, I would not use them if the students have difficulty completing other at home assignments. I would recommend that science teachers use videos that are at least a little bit entertaining or interesting. They should not use videos that are simply a portable lecture with a person giving straight facts the entire time. They should also not use those videos that try to be extremely humorous but end up being simply ridiculous. Instead videos should be used that give information and also relate that information something students can identify with, to keep them interested.

Science P7

(removed)

Questions B

1) To science teachers, I would recommend use the iPods only for homework use. It should contain videos on certain topics, and then follow up questions should be asked. The iPods should not be used in class because any videos viewed in class should be shown on the television.

2) Teachers should teach the topic by lecture. Show a video in the class to provide visual learning for the students. Then the students should receive the video on their iPod and can then re-watch the video at home to answer questions for a homework assignment.

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BIOGRAPHICAL SKETCH

Lisa Hightower has been working with educational technology for the past 10 years through the University of Florida's College of Agricultural and Life Sciences and the Florida Cooperative Extension Service. She has worked in a variety of roles including reporter, video producer, instructional designer, web developer, and graphic designer. Ms. Hightower has been continually challenged to find creative solutions to educational problems. Her work with technology has led her to work with distance education and mobile learning. Ms. Hightower finds the most interesting part of her career has been meeting people with a passion for education and helping them develop worthwhile projects. Ms. Hightower has a Bachelor of Science degree in journalism at the University of Florida, and an associate's degree in creative writing from the University of Washington.