Journal of Agricultural Education
Volume 50, Number 4, pp. 110 - 119
DOI: 10.5032/jae.2009.04110

AGRICULTURAL SCIENCE AND TECHNOLOGY TEACHERS' PERCEPTIONS OF IPOD AND MP3 TECHNOLOGY INTEGRATION INTO CURRICULAR AND COCURRICULAR ACTIVITIES

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Abstract

The purpose of this study was to describe agricultural science and technology teachers' reaction to iPod and mp3 technology use and potential use in both curricular and cocurricular activities. A total of 112 unique respondents provided written responses to open-ended questions. Study findings reveal that agricultural science and technology teachers see iPod and mp3 technologies as beneficial, yet some teachers find this technology to be unusable due to campus restrictions and student abuse. Teachers provided a multitude of possible applications for iPod and mp3 technologies: contest preparation and team training, general classroom enhancement, specific classroom content areas that could benefit, applications for absence/make-up work and homework support, use with substitute teachers, assisting special populations, use for organization of content, and additional creative applications. Overall, teacher reaction to the use of iPod and mp3 technologies was positive and yielded findings that can be useful to teachers, researchers, and providers of educational content. This article strives to give voice to the individual teacher.

Introduction and Theoretical Framework

The use of technology within and outside of the classroom cannot be ignored. Students use technology on a regular basis (i.e., checking e-mail, viewing the latest YouTube™ video, or downloading favorite music to an iPod™ or preferred mp3 player). Those involved in education must understand how students are using technology in order to consider ways in which new technologies can be used to advance the goals of education. More than 11,000 teachers across the United States deliver innovative, cutting-edge, integrated curricula as part of the agricultural science and technology programs (American Farm Bureau Federation, 2000). According to the National FFA Organization (2008a), agricultural science and technology programs across Texas educated 62,708 students during the 2006-2007 school year. In fact, the Texas Education Agency (2008) stated that the total number of agriscience students currently enrolled in Texas is 120,110. The students involved in these programs use text messaging, e-mail, cell phones, and social networking sites on a regular basis. They are part of the "Millennial" generation, born after 1982 (Oblinger, 2003).

Different generations have depended on technology in different ways. Taylor (2008) presented a breakdown of the different generations, from "Traditionals," the oldest of the currently employed generation, to NeXters, or Millenials, and how they do and do not depend on technology. Taylor stated that the "digital divide between the older (Traditional and Boomer) and younger (X and NeXt) cohorts is a chasm that must be bridged…" (p. 7). The question that should be asked is whether or not teachers, agricultural science and technology teachers

in particular, are interested and/or willing to use what could be considered NeXter generation technology to help bridge the gap between the generations. Are these individuals willing to try new technologies such as iPods and mp3 players to enhance their curricula and FFA activities?

Recognizing that the range in age of agricultural science and technology teachers is approximately 23 to 62 years of age (Murphrey, Miller, & Roberts, in press), most teachers are a part of the baby boomer generation or Generation X, as defined by Oblingner (2003). It is critical to consider how these teachers may perceive technology that is a part of the generation that they are in fact teaching. How open are these teachers to technology? Are teachers aware of the technological capabilities of their students, and do they know how to use this particular student interest to their advantage? Are teachers aware of the ways that technology can be used to help students?

Marshall, Herring, and Briers (1992) shared that students are influenced to enroll in agricultural science courses based on what they think they will be doing in the class, "class characteristics" (p. 20), and also by the perception of "identity enhancement" (p. 20), which is defined as "enhance[ing] their identity as a person" (p. 22). In order to address these expectations, agricultural science and technology teachers must be aware of the tools that these students use so that they can communicate effectively. Torres, Ulmer, and Aschenbrener (2008) stated that "agriculture teachers are faced with the challenge of meeting both the traditional teacher roles as well as the roles specific to agricultural education programs" (p. 75). The National FFA Organization (2008b) outlined multiple roles of agriculture teachers in the program called Local Program Success. Documents in this program reveal the diversity of expectations and requirements for agricultural science and technology teachers, ranging from classroom and laboratory instruction to working with communities. The job of an agricultural science and technology teacher is not clearly defined because it varies across the discipline. In an effort to study job satisfaction, Torres et al. studied how teachers distribute their workload across various requirements and found that teachers "spent the largest proportion of time in the combined areas of planning and instruction" (p. 85). Could new technologies allow teachers to focus on additional areas?

To some individuals, the iPod and similar mp3 technologies may appear to be a "toy" that is likely to cause a disruption in learning. However, as one considers possible uses for portable media devices, it becomes clear that these technologies can in fact be useful and could even be a positive addition to an educator's toolbox. iPod and similar mp3 technologies have been diffused at a rapid rate. Ross (2007) shared that since Apple introduced the device, more than 70 million iPods have been sold. While this does not mean that all students have access to iPods, it does imply that many students may in fact possess them and that teachers have the opportunity to take advantage of the device.

Understanding how technology is and can be used has been perceived as important by past researchers. In 1998, Murphy and Terry reported the results of a nationwide Delphi study focused on determining opportunities and obstacles for distance education in agricultural education. The authors concluded that "electronic communication, information, and imaging technologies will improve how we teach in agricultural education settings" (p. 34). However, they also concluded that the time to become proficient in using technologies could be an obstacle to their adoption.

New educational technologies may also enhance the curricula in other ways. It has been noted that the presentation of science in context can remove obstacles that prevent students from being interested in science (Jelinek, 1997, as cited in Balschweid & Huerta, 2008). The importance of having access to materials that could be used by a substitute teacher was articulated by novice teachers (Ball, Knoblock, & Hoop, 2007). It is possible that technology could address issues such as these. Whittington, McConnell, and Knobloch (2006) reported that the "greatest influences on teacher efficacy were the number of class preparations the teacher was responsible for and the perceived excellence of the student

teaching experience" (p. 35). Could technology help in class preparations? If media and tools were more readily available, could this be helpful? Or, is instruction in agricultural science and technology too individualized for this to work? Innovative use of technology in the classroom was indicated as a characteristic of effective agriculture teachers (Roberts & Dyer, 2004). Each teacher sees technology from a unique perspective, and with that perspective can be seen challenges and opportunities. Articulating individual teacher perspectives of the use of specific technologies encourages understanding of how these technologies can facilitate learning.

The theoretical framework of this study is based on the diffusion of innovations (Rogers, 2003) and on the individual perspective of this diffusion. Rogers defined the innovation-decision process as moving from initial knowledge to attitude formation, to the act of making a decision of adoption or rejection and finally to implementation and confirmation. Understanding the innovation-decision process of agricultural science and technology teachers as it relates to the iPod and similar mp3 technologies is critical in meeting the needs of the current generation. Rogers stated, "…a farmer could drive past a hundred miles of hybrid corn in Iowa and never 'see' the innovation" (p. 171). This could also be said for iPod and similar mp3 technologies. Given that the social system will impact the diffusion of the innovation (Rogers), it is important to give voice to the teachers that exist and operate within that social system. Only through the voice of the teachers can one understand how an innovation is being implemented. In fact, often innovations are implemented in ways that were not planned or expected. Rogers defined re-invention as "…the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation" (p.180).

As one considers re-invention of the iPod and similar mp3 technologies, it is important to think about how instruction in agricultural science and technology is delivered. Experiential learning has been a consistent component of secondary agricultural education programs throughout history (Roberts, 2006). In fact, teachers strive to use hands-on activities to enrich the learning experience for students. Educational theories such as Bloom's taxonomy of educational objectives (Bloom, 1956) and Kolb's theory of experiential learning (Kolb, 1984) have guided educators throughout the years in this pursuit. It is important to reflect on how these technologies could be utilized in the context of such educational theories. Using technology in the classroom is not a new idea; however, as shared by Kotrlik, Redmann, and Douglas (2003), "much more needs to be done to encourage and support agriscience teachers in the integration of technology in the teaching/learning process" (p. 88). This study seeks to give voice to teachers' reaction to iPod and mp3 technology use and potential use in both curricular and cocurricular activities.

Purpose

The purpose of this study was to describe agricultural science and technology teachers' reaction to iPod and mp3 technologies and document potential use in both curricular and co-curricular activities.

Methodology

In an effort to address these questions, and as part of a larger study, two open-ended questions were posed. First, "Specifically, what content would be appropriate for use with iPod and mp3 technologies or mp3 devices? And why?", and "For you, when would iPod and mp3 technologies be useful as an instructional tool?" Analyzing the responses provided to these questions allowed the researchers to gain insight into both potential applications of technology and possible barriers and challenges.

The quantitative methodology employed in the study used a mailed questionnaire and was reported in a previous article (Murphrey et al., in press). The population of interest was all agricultural science and technology teachers in Texas (N = 1605) determined by the *Directory of Texas Agricultural Science and Technology Teachers* (Instructional Materials Service, 2007). A census of the population was deemed impractical and

unnecessary, so a sample of 310 was randomly drawn from the population (Krejcie & Morgan, 1970).

Because of the mixed-method design of the larger study, the tailored design method (Dillman, 2000) was followed in the administration of mailed questionnaires. A pre-notice letter was sent to teachers in the sample. The questionnaire and cover letter were mailed a few days later. A thank you postcard was mailed approximately 10 days later, and a replacement questionnaire was sent 2 weeks later. A second cover letter was included for non-responding teachers. These procedures yielded 130 responses (41%). Double-dipping non-response procedures (Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983) yielded an additional 19 responses totaling 149 responses (48%). Of the 149 individuals that completed the questionnaire, 97 responded to the first open-ended question, and 107 responded to the second open-ended question. A total of 112 unique respondents provided written comments in the open-ended question area.

Dooley (2007) shared the importance of utilizing qualitative research methods as a means of "fully describing the phenomenon under investigation" (p. 40). Written responses were analyzed using both quantitative and qualitative procedures. Responses were directly transcribed into a typed document, with each statement coded by respondent number. A different notation was used for each question so that responses could be tracked not only to the respondent but also to the question. Content analysis was employed to create categories. Responses were initially categorized by one researcher into general categories which arose from the actual data. The categories were then broken down further into more specific and descriptive categories using the constant comparative method (Dooley).

Responses from the two questions were then combined into one document after careful consideration due to the nature of the responses being similar. Duplicate responses provided by the same respondent under both questions were removed. A review panel was formed consisting of faculty intimately involved in the agricultural science and technology teacher preparation program at Texas A&M University. These faculty members have constant interaction with teachers and understand the teacher perspective. Detailed categories and representative comments were presented to the review panel in the form of an informational packet. The review panel served as a "comprehensive member check" (Lincoln & Guba, 1985, p. 373). Following feedback from the review panel, additional categorization and synthesis of ideas collected were accomplished. Each statement was categorized under only one category. All comments remained in the words of the respondents until a model was formed that represented responses collected. The importance of this data relates to the fact that it is information that has come directly from the teachers' perspectives.

Results and Findings

Of the 149 individuals that completed the questionnaire, a total of 112 unique respondents provided written comments in the open-ended question area. The majority of this subset were males (75.0%). The average respondent was 37.85 (*SD* = 9.83) years old and had taught for 13.01 (*SD* = 9.48) years. Nearly all the respondents (98.2%) had heard of iPods or mp3 players, but only 23.2% of the respondents personally owned an iPod or mp3 player, and only 18.8% indicated that they had access to one at school. The vast majority (88.4%) described their abilities to use computer technologies as either intermediate or advanced.

Applications

Analysis of the comments provided by the teachers revealed strong support for the use of iPod and similar mp3 technologies. Twenty-two respondents (07, 15, 17, 26, 67, 84, 98, 99, 125, 163, 172, 173, 181, 188, 196, 200, 233, 258, 266, 267, 272, 294) indicated that there were opportunities across all areas for use. As one respondent stated, "[there are] a million uses – lots of different topics" (07). Another stated, "I really believe almost every aspect of the program and classroom [could benefit]" (200). Figure 1 provides a summary of agriscience teachers' perspectives of

iPod and mp3 technology integration into curricular/cocurricular activities.

One particular area of interest was the use of the iPod and mp3 technologies for general career development event (CDE) and leadership development event (LDE) preparation and team training. Ten individuals (15, 90, 139, 204, 214, 223, 239, 240, 260, 283) cited contest preparation as a use for iPod and mp3 technologies, while nine individuals (7, 59, 117, 125, 163, 233, 238, 275, 294) cited team training. As stated by one respondent, "I would love to be able to prepare students for contests with these tools" (15). In fact, 17 individuals specifically listed LDE and 18 individuals specifically listed CDE as training that could be delivered on iPod and similar mp3 technologies. As one respondent stated, "This would be quite an opportunity for students training for LDE and CDE teams as well" (120). Respondents noted that it could be used to review rules and guidelines (19), practice in small groups (64), and be used outside the classroom (96). Several respondents identified specific CDE or LDE activities that could benefit from the use of iPod and similar mp3 technologies such as: livestock team training (19, 67, 86, 89, 110, 176, 240), tool identification (89, 258, 274), agricultural mechanics (225), parliamentary procedure (80), FFA contests (294), and contests that require memorization (308).

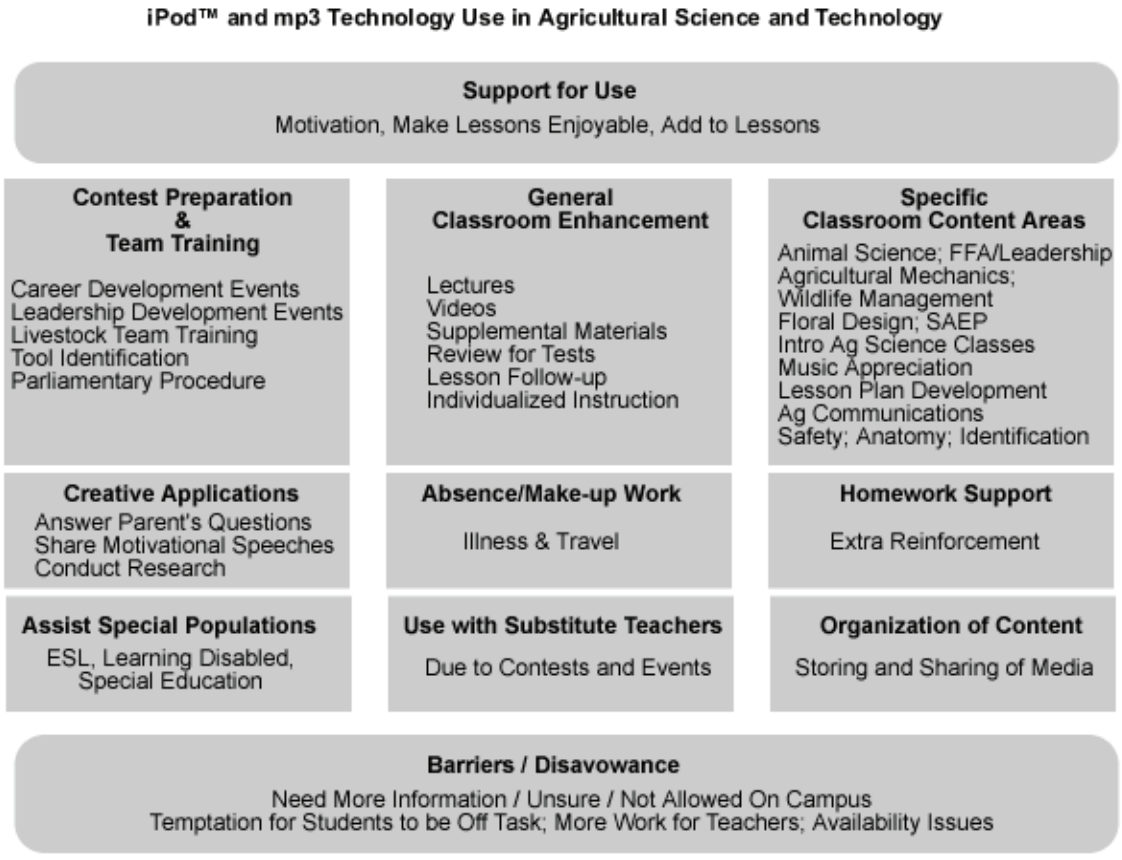

Figure 1. Summary of agricultural science and technology teachers' perspectives of iPod and mp3 technology integration into curricular/cocurricular activities.

The iPod and similar mp3 technologies were articulated by respondents as having value to enhance classroom lessons. Lectures (19, 74, 166, 181), videos (11, 39, 156, 173, 183, 243, 236), and supplemental topics beyond the textbook (93, 94, 96, 165) were specifically mentioned as having potential value. "Training students about things they cannot see in the classroom" (93) could be accomplished with these tools. Respondents expressed that the videos could "reinforce" (156, 243) lessons. Several respondents (144, 174, 175, 237, 239, 245, 258, 274, 297) felt that the iPod and similar mp3 technologies could be used to review material in preparation for tests, as a follow-up to lessons, and as a way to share notes. Individualized instruction was articulated as a potential benefit to these devices. The potential for "self-paced video courses" (204), "freedom for reinforcement and variety" (99), and "advanced students who would like to work at their own pace" (204) was noted.

The iPod and similar mp3 technologies was also articulated as being useful for specific classroom content areas including animal sciences (19, 59, 173, 183, 243, 258), FFA/leadership classes (80, 117, 128, 146, 183, 224), agricultural mechanics (19, 127, 172, 221, 258, 296, 308), and wildlife management (19, 183, 296). Other areas mentioned included floral design (89, 165), SAEP (supervised agricultural educational projects) (196), introductory agricultural science courses (117, 165), music appreciation (116), lesson plan development (83), and agricultural communications (183). As one respondent stated, "They would be awesome for students to watch welding setup and shut down clips on" (258). Specific sub-areas such as safety (172), anatomy (19), and identification (296) were noted across areas.

Meeting the needs of absent students was mentioned by many teachers (1, 7, 11, 17, 28, 69, 74, 86, 90, 99, 120, 127, 146, 191, 232, 241, 260, 275, 296, 303). Agricultural science and technology teachers are faced not only with absences due to illness (303) but also due to travel (17), trips (74), and livestock show participation (241). Given that much of the instruction provided in these classes is focused on hands-on activities, the iPod and similar mp3 technologies were articulated as being a possible means to "see procedures being performed" (120) even if they are missed and "explaining complex topics…such as [identification of] breeds, flowers, etc." (90). Teachers specifically expressed the potential for iPod and similar mp3 technologies to provide a means for students to stay up in class while participating in other activities. "For students who know ahead of time that they're going to be gone, they can do the assignments early" (99). This technology could also be used for "self-motivated students" (42), "when traveling to stock shows and contest" (223), and "for review on the trip to contest site[s]" (296).

The iPod and similar mp3 technologies was also indicated by several teachers to be a tool that could be used with homework (48, 59, 166,175, 218, 224, 239, 245, 297). Teachers indicated that the iPod and similar mp3 technologies could be used "when students need extra reinforcement on materials beyond what we do in class" (175) or for "listening to stories/lectures after school homework" (245).

Teachers in the area of agricultural science and technology are often faced with the requirement to be away from the classroom in order to attend contests and livestock shows with a subset of students, leaving a group of students on campus to be supervised by a substitute teacher. The iPod and similar mp3 technologies was indicated as a tool that could be used to assist substitutes (93, 116, 163, 173, 183, 241, 243, 282, 294, 303). As one respondent stated, "When away on trips or stock shows they could be used to teach a lesson while I'm away" (163).

The iPod and similar mp3 technologies were also perceived by teachers to be a tool that could assist them in serving special populations (96, 120, 165, 175, 198). As stated by one teacher, "It would also be useful for modified content with students who have an IEP (Individualized Education Plan) that says students need a copy of notes/lecture" (96). Populations mentioned included ESL (English as a second language) students (165), learning-disabled students (120), and special education students (198).

Many creative applications for the iPod and similar mp3 technologies were noted by teachers. One teacher shared that these devices could be used to answer parent's questions if a child were to get hurt (127) by showing them a particular procedure. Others mentioned using the device to show things to administration (86), share motivational speeches (146), and even conduct research (191). One particular creative example shared: "My ag mechanics boys have used video clips in their phones to show me ideas for new projects and to show judges at shows how their project works in the field" (175).

Teachers also expressed that the iPod and similar mp3 technologies might provide a means of organizing content to be used in classes in a way that could be shared more easily with students (11, 19, 83, 272). "I feel that an iPod would be a very useful tool because it would give me a way to store information that can be easily transferred to a student or played in a classroom" (272).

Barriers and Challenges

While many respondents felt that the iPod and similar mp3 technologies would increase "motivation" (240) and "add to a lesson and make it more enjoyable for the student by adding something that they are used to" (272), there were many respondents that felt they would need additional information regarding the technology before being able to provide insight into not only "how" but "whether or not" it should be used.

A total of 28 respondents indicated that they would need more information about the technology (7, 9, 15, 39, 64, 102, 122, 129, 231, 235, 238, 260, 282), were "unsure" of how it could be used (23, 42, 65, 139, 259, 306), or simply stated "I do not know" (28, 112, 147, 155, 280), "no clue" (257, 262), or put "???" (68, 206) in response to the questions. As one respondent stated, "Most of my students want one of these devices and I would be interested to find out if using these devices would help students to work harder on their work in my subject area" (15).

A prominent theme revealed in the data related to the restriction of iPod and similar mp3 technology use on school campuses. Several respondents revealed that these devices were not allowed on campus (37, 98, 119, 128, 147, 154, 239, 266, 267) and one teacher preferred that the devices not be brought to class (179). Reasons for not using iPods or similar technologies included the temptation for students to "get off task" (48, 89, 164), the creation of more work for the teacher (110, 126, 176), and availability issues (98, 225, 236). Some respondents merely stated that they would not use the technology (87, 164).

Conclusions

In a time when technology provides the opportunity for individualized instruction and teachers are in search of new and innovative methods of keeping their students interested in learning, the iPod and similar mp3 technologies are beginning to find their way into the education forum. Based on the findings of this study, it can be concluded that some agricultural science and technology teachers see these technologies as beneficial and complementary to their classrooms. In fact, some teachers believe that iPod and similar mp3 technologies could help motivate students in learning and that these technologies could help make lessons more enjoyable, thus possibly strengthening student learning. These findings support the earlier work of Roberts and Dyer (2004), along with the work of Murphy and Terry (1998).

Strong response from participants in this study revealed positive interest in the application of iPod and similar mp3 technologies in CDE and LDE preparation and team training. It can be concluded that teachers feel that these technologies would complement the training of their students specifically by assisting in rule review and individual and small group practice outside of scheduled class time. These conclusions support other studies that indicated that teachers see how these technologies could enhance some of the more experientially based learning activities within agricultural education (Roberts, 2006).

Based on further responses, it can be concluded that teachers see value in the use of iPods and similar mp3 technologies to enhance classroom lessons. Not only did respondents show interest in lecture, video, and supplemental lessons to a class textbook, they specifically stated that these technologies would benefit both advanced students looking to work at their own pace and students who need more reinforcement or just time to review. Additionally, teachers believed that these technology tools could be used to assist students in staying up to date with classroom instruction even when they are absent during both long and short periods of time.

Teachers also noted that using iPods and mp3 technologies could be helpful to special population students. It can be concluded that teachers perceive the ability to modify and provide content for special population students to be a potential benefit. Working at their own pace with technologies such as this could assist these students in the mainstream classroom situation. Additional applications of the technologies included homework reinforcement, assistance to substitutes when teachers were away, sharing of speeches and presentations, and conducting research. Using these materials for substitute teachers is consistent with recent work by Ball et al. (2007).

It is important to note that not all teachers reported iPod and similar mp3 technologies as useful. It can be concluded that some teachers are unsure of or simply don't know how these technologies could be utilized to enhance instruction. Rogers (2003) noted that knowledge of an innovation was essential for adoption, so it would appear that some teachers were not at this stage yet. Several teachers reported that iPod and similar mp3 technologies are not allowed on their campus, and therefore are of little use to their classroom and some reported these technologies as a way for students to be distracted or "get off task," rather than as a compliment to their classroom. A few teachers felt that using these technologies would create more work for them, and fewer still stated that they simply would not use these technologies for any reason.

Recommendations and Implications

The design of this study does not allow one to generalize these findings to all teachers. However, there are several recommendations and implications that should be considered in light of the responses received.

Given that several of the teachers surveyed perceive iPods and similar mp3 technologies as a beneficial enhancement to their classroom for a variety of topics, it is recommended that opportunities be provided for teachers to learn more about the specific educational qualities of their use. These opportunities could be in the form of professional development, in-service training, or downloadable podcasts for teachers to "test-drive" before committing to the cost and time of creating their own lesson tools.

Continuing to take into account the fact that some teachers see these technologies as beneficial, it is further recommended that teachers conduct Internet searches and/or collaborate with other schools and FFA chapters that currently utilize podcasts, iPod and similar technologies. Gaining a better understanding of how iPods, podcasts, and mp3 players are already being used in various educational settings will allow interested teachers to greatly improve their understanding of effective methods to incorporate iPods, podcasts, and mp3 players into a number of aspects of teaching agricultural science and technology.

For teachers who are ready to discover more about iPod and similar mp3 technologies, in-depth in-service training, perhaps even summer workshops, could be organized to assist teachers in fully utilizing these technologies into their educational offerings. Based on the findings of this study, it is likely that teachers who are supportive of the use of these technologies will actually put them to use with their students. Demonstrating and utilizing what they have learned and know about iPod and similar mp3 technologies used in the classroom could also assist in promoting the use of these technologies to others who may not be as enthusiastic to investigate their use for themselves.

Because of the high interest that teachers had in using the iPod and similar mp3 technologies to assist students in preparing for CDEs and LDEs, it is recommended that the National FFA Organization make additional recordings of these events available in downloadable formats for use on these technologies. As more recordings in this format are made available, a study should be conducted to determine which specific CDEs and LDEs are in highest demand, so that focus can be placed on enhancing those event recordings.

Given that some teachers stated that these technologies were not allowed on their campuses, further research should be conducted that articulate specific uses of iPod and similar mp3 technologies so that administration can become more informed. With an informed administration, perhaps iPods and similar mp3 technologies could be seen as an asset and not a temptation for students to get off track.

Demonstration of the use of iPods and similar mp3 technologies in the classroom and in cocurricular activities such as CDE and LDE teams can be very useful in encouraging diffusion. Documentation of strategies to use these technologies effectively could assist in increasing their adoption and thus meeting the needs of the current generation.

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