

# MP3 PLAYERS: APPLICATIONS AND IMPLICATIONS FOR THE USE OF POPULAR TECHNOLOGY IN SECONDARY SCHOOLS

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This article explores potential uses for MP3 players in secondary classrooms. It presents an overview of current applications and describes an exploratory study of classroom uses. Seven high school teachers and one teacher educator participated in a three-month project to examine MP3 technology as applied to high school instruction. Their ideas and recommendations illustrated congruence with the existing knowledge base and help to clarify site-based support requirements, implications for school media centers, and emerging applications to high school curricula.

Within the rapidly expanding technology marketplace, MP3 players are widely used by teens and young adults as a medium for entertainment (Lenhart, Rainie & Lewis, 2001). Users, generally those between the ages of 8 and 18, spend approximately 6.4 hours per day, or 44 hours per week using multimedia (Kaiser Family Foundation, 2005). As adolescents and young adults are using entertainment technology with increasing frequency, it seems appropriate for educators to explore ways to utilize this new form of e-technology in the classroom. Gee (2003) offers some compelling reasons for why such inquiries may be advisable. He suggests that technology needs to be recognized as a form of literacy, and that technology-based pedagogies may be more effective than traditional teacher-centered pedagogies. Tapscott (1998) asserts that the needs of the *N-Gen* (Internet Generation) are such that teachers need to integrate interactive forms of technology into their pedagogical repertoires.

In an attempt to better understand an emerging form of technology that may

meet the needs of the *N-Gen*; this article explores how MP3 players can be used as educational tools in secondary classrooms. This article describes how MP3 players were used by local high teachers to examine the potential for classroom applications of this new technology.

## Why MP3 Players?

MP3 players are becoming extraordinarily popular. IT Facts (2004) estimates that 46.8 million units were sold in 2004. This number is projected to increase to 132 million units by 2009 (EE Times, 2005).

Beyond the ubiquitous Apple iPod, several different makes of MP3 players are currently available. Popular manufacturers include Apple, iRiver, Sony, Rio, Dell, Zen, Samsung, Creative Labs, Panasonic, Archos, and RCA. Basic players range in price from under \$100 to more than \$399 with sophisticated home stereo systems starting at \$800 (Gowan, 2005; In iPod America, 2005). The new iPod Shuffle sells for \$99 and links users to Apple's profitable iTunes site where songs can be downloaded for \$.99 each. Music providers

and accessory manufacturers abound, as each tries to serve the needs of the owners of the more than 50 million MP3 appliances sold to date. MP3 players have become multi-functional, multimedia products that allow users to play electronic games, watch music videos and movies, and view digital photographs and other images (Mobile Magazine, 2006; PhysOrg.com, 2005).

### **Problem Statement**

#### *A Compelling Interest*

Given the technological opportunities that MP3 players may offer, coupled with the broad current usage of this device among adolescents and young adults, an examination of classroom applications is of compelling interest.

Settlage, Odom and Pedersen (2004) indicate that in an assessment of technology acumen among teachers, knowledge about MP3 players was lowest. Paradoxically, given the extent to which this media has been embraced by youth and adolescents-are teachers and teacher educators missing opportunities to use MP3 players in the classroom? Other potential questions included: (a) what can MP3s do well and what are their limitations? (b) what recommendations do teachers have with regard to the potential for MP3 use? (c) what curriculum extensions might MP3s appropriately lend themselves to?

#### *Exploring the Questions*

With an overall objective of exploring potential classroom applications for MP3 technology, three subsequent objectives are as follows: ascertain the extent of the current body of literature relevant to MP3

classroom use and educational applications; query secondary teachers with regard to potential uses of MP3 technology within the curricula; and assemble recommendations on the use and further exploration of MP3 players among participants and the researcher-practitioner community. These objectives are explored below as they relate to a literature search, an exploratory field test of MP3 players, and a discussion of outcomes and implications.

#### *What Does the Literature Say about MP3 Players?*

Besides trying to ban MP3 players from high schools (Engadget, 2005), information on what teachers are doing or thinking about doing with MP3 players is not abundant. Concerns about negative effects are more readily available. According to NewsTarget.com (2005) perceived negative effects of MP3 players on students include reduced levels of socialization and peer interaction and masking of important environmental sounds such as sirens and other warnings. MayoClinic.com (2006) reports that hearing loss among MP3 players may be accelerated due to the level of sound the players can produce and the type of earphones commonly used.

On a more hopeful note, the following sources look at the potential for e-learning as well as MP3 player and ancillary applications in education. This review examines forms of e-learning and emerging technology as reported in professional journals, the popular media, and by the manufacturing industry.

*A Review of Literature about Applications.* Applications relate to actual

classroom uses as well as to proprietary products with potential classroom applications. Each application coordinates with a link that gives an example or further information. Table 1 provides a summary of current and perceived applications derived

Table 1

*Literature Review: Potential Classroom Applications for MP3 Players and Links*

Application	Description
Recreational Use (music)	Students listen to their own MP3 players while doing seat work; focus & calming effect observed ( <a href="http://www.usatoday.com/tech/news/techinnovations/2006-01-05-school-gadgets_x.htm">http://www.usatoday.com/tech/news/techinnovations/2006-01-05-school-gadgets_x.htm</a> ).
Data Storage	MP3 player used as auxiliary hard drive ( <a href="http://www.gadgetpeople.co.nz/mp3playeruses.php">http://www.gadgetpeople.co.nz/mp3playeruses.php</a> ).
Personal Organizer	Synchronize with MS Outlook–Calendar & Contacts. ( <a href="http://www.apple.com/support/ipod101/maximize/2/">http://www.apple.com/support/ipod101/maximize/2/</a> ) and ( <a href="http://images.apple.com/education/ipod/pdf/iPod_Calendars.pdf">http://images.apple.com/education/ipod/pdf/iPod_Calendars.pdf</a> ).
Audio Books	School library lends MP3 Players and audio books; or has audio books available for download ( <a href="http://www.audible.com/">http://www.audible.com/</a> ).
Language Learning	Download MP3 files for use in modern language classes ( <a href="http://www.languageimpact.com/articles/rw/mp3_revolution.htm">http://www.languageimpact.com/articles/rw/mp3_revolution.htm</a> ).
School Libraries	Circulating iPods; MP3 libraries and recordings of school events ( <a href="http://www.libraryjournal.com/article/CA515808.html">http://www.libraryjournal.com/article/CA515808.html</a> ).
Music Classes	Record music for use as homework; student music productions; music storage ( <a href="http://www.classiccat.net/">http://www.classiccat.net/</a> ).
Content-Specific	Archival materials, science and social studies programs and speeches ( <a href="http://www.big6.com/showenewsarticle.php?id=256">http://www.big6.com/showenewsarticle.php?id=256</a> ).
Lecture Recordings	MP3 players with voice recording capabilities can be used to record lectures ( <a href="http://www.apple.com/education/solutions/itunes_u/">http://www.apple.com/education/solutions/itunes_u/</a> ).
Radio Recordings	MP3 players with FM radio recording capabilities can be used to record live broadcasts ( <a href="http://www.ericdigests.org/1999-3/radios.htm">http://www.ericdigests.org/1999-3/radios.htm</a> ).
PE/Coaching	MP3 players with both audio & video used in game analysis and in PE classes ( <a href="http://www.pesoftware.com/Technews/news.html">http://www.pesoftware.com/Technews/news.html</a> ).
E-tours	PodTrip - MP3 files downloadable to players with travel and tour directions ( <a href="http://www.podtrip.com/faq.html">http://www.podtrip.com/faq.html</a> ).
Podcasting	Students develop and record radio programs; downloadable to MP3 players ( <a href="http://www.learningcircuits.org/2005/jun2005/0506_trends">http://www.learningcircuits.org/2005/jun2005/0506_trends</a> ).

from the literature, news reports, and industry sources.

Anecdotal reports relate instances where individual middle and secondary teachers permit students to listen to MP3 players while doing seat work. Teachers relate that recreational use in the form of listening to music helps some students to stay focused and does not disrupt other students who require quiet (vBulletin, 2005). A proprietary MP3 product from Examstutor.com maintains multiple downloadable files in biology, chemistry, physics and business. Examstutor.com promotes the use of MP3 players and learning modules for students with dyslexia, impaired vision, and second language learners. Apple's iPod and several other product lines also have the capability to synch with Microsoft Outlook. This extension allows student users to maintain calendars with daily assignments as well as address books on their players.

School libraries are beginning to invest in audio books as an alternative to hardcopy texts (Minkel, 2002). Audible.com (2005) offers more than 6000 downloadable MP3 files that include books, newspapers and magazines. Libraries subscribing to Audible.com, or others, can download digital books into MP3 players and lend the players to students. Some school media centers collect important audio events as MP3 files that can be downloaded by library users (Auditory Options, 2004). It is likely that emerging technology will allow libraries to download materials to MP3 players that will automatically erase at the end of the loan period. School libraries may also realize a cost savings as MP3 files are considerably less expensive to manage and

store than books and videos.

Some efficiencies may also be gained by music teachers through the use of MP3 technology. As music is already the primary use of MP3 players, applications are readily apparent to music teachers. Kuzmich (2000) discusses several music related initiatives including efficiencies associated with sending and receiving large music files, the advantages of storing music on MP3 files as opposed to disk and audio tape, and the potential to preview recordings and promote student compositions and productions. Music teachers may also be able to increase instructional time by sending music home with students on MP3 players for practice or review (Litterst, 2004).

Teachers and students in other content areas may benefit from using MP3 players to download audio clips containing content-specific information. American Rhetoric (2005) offers *Speech Bank*; a repository of more than 5000 speeches, sermons, lectures, and debates. They may be downloaded at no cost to the user. The Canadian Broadcasting Corporation (2005) maintains MP3 files of a popular science program called *Quirks and Quarks*. Users can download audio files on an array of topics dating from 1988 to the present.

With applications to social studies and history, National Public Radio (NPR) files have been made available by PublicRadioFan.com (2004). Several commercial products facilitate the capture of NPR audio and conversion into MP3 files for storage and playback.

While static on-line tours of museums and cities have been available for some time on the Internet, students and travel-

ers are now able to download audio tour guides, or *PodTrips*, to their MP3 players. Discovery Walks (2005) has MP3 files available for London, New York, Rome, Venice and other Mediterranean cities (Tedeschi, 2004)

Physical education teachers and coaches, who have traditionally performed game analysis with videotape, can use new models of MP3 players that combine both audio and video capabilities. Specially equipped MP3 players can be loaded with digital video and audio and give immediate feedback to students, players and coaches (Newell, 2003). An added benefit, due to the portability of such products, permits real-time viewing on the field or at team meetings.

Several colleges and universities are utilizing MP3 players as supplements to classroom lectures and modern language classes. These include Duke University, Drexel University, Georgia College, and Stillman College (Graham, 2005; Read, 2005). Notably, Duke University distributed 1,650 Apple iPods to incoming freshman in the fall of 2004. The intent of this initiative was to enhance student capabilities to listen to lectures, practice foreign languages, and study dialects (Graham, 2004). More recently however, Graham (2005, p.1) reported that Duke has scaled back the wholesale distribution of iPods. Instead, students will receive MP3 players only in classes where instructors have requested their use.

#### *What do Teachers Have to Say about MP3 Players?*

Given the author's responsibilities for preservice secondary programs in the

Department of Teacher Education, a decision was made to initiate an exploratory study of current and potential applications of MP3 players in secondary classrooms. A partner high school was designated as the site of the study and seven teachers at the school were invited to examine MP3 players and to participate in focus group discussions. This approach was based on the premise that data collection, field-testing, and dissemination within a partnership school would be an appropriate reciprocal activity between the university and our school partner.

#### **Methodology: Grant Preparation and Material Selection**

To facilitate a field test of MP3 players, an application was made for a research grant that would fund the purchase of representative units. The proposal outlined the parameters of the investigation, the general types of MP3 players that would be tested and general methodology to be used during the assessment phase of the investigation. It was anticipated that at least four MP3 players would be purchased and given to high school teachers during the exploratory phase of the project. Participants were permitted to retain their MP3 players upon completion of the study.

Subsequently, focus group sessions would be used as to generate data on proposed classroom uses of MP3 players. Funding was approved in the amount of \$800.00 and allowed for the purchase of representative models of popular MP3 players.

*MP3 Player Selection*

A set of criteria was developed that would maximize available functions among the various types of players to be acquired. Devices were selected that had the capability to (1) store between 64 MB to more than 1 GB sized MP3 files; (2) record audio with a built-in microphone; (2) tune in to FM radio stations and record programming; (3) were relatively inexpensive to purchase; and (4) represented popular models. Based on these criteria, a

grant was used to fund the purchase six MP3 players.

*Selecting and Orienting Participants*

In an effort to purposely select participants (Miles & Huberman, 1984) four teachers who worked with preservice social studies students were asked to participate in the investigation. The school media specialist also participated. He, in turn, recommended a special education and a French teacher who both consented to par-

*Table 2*

*Participant Profiles: Content Area, Numbr of Years Teaching, Make and Model Examined*

<i>Participant</i>	<i>Content Area</i>	<i>Number of Years Teaching</i>	<i>Make and Model</i>
<i>Jack</i>	<i>Social Studies</i>	<i>10</i>	<i>Creative Labs Nomad Muvo 256MB MP3 Player</i>
<i>Chuck<sup>1</sup></i>	<i>Social Studies</i>	<i>10</i>	<i>Creative Labs Nomad Muvo 256MB MP3 Player</i>
<i>Steve<sup>1</sup></i>	<i>Social Studies</i>	<i>3</i>	<i>Creative Labs Nomad Muvo 256MB MP3 Player</i>
<i>Carol</i>	<i>Government, Economics</i>	<i>5</i>	<i>iClick 256 MB USB Drive MP3 Player</i>
<i>Carlos<sup>2</sup></i>	<i>Media Specialist</i>	<i>32</i>	<i>Gateway 4-in-1, 64MB Music Player</i>
<i>Gina<sup>2</sup></i>	<i>Modern Language (French)</i>	<i>29</i>	<i>Gateway 4-in-1, 64MB Music Player</i>
<i>Margo<sup>2</sup></i>	<i>Special Education (Moderate)</i>	<i>9</i>	<i>Gateway 4-in-1, 64MB Music Player</i>
<i>Gary</i>	<i>Higher Ed</i>	<i>15</i>	<i>Apple iPod Mini Portable MP3 Player</i>

*Note.*<sup>1</sup> *Chuck and Steve shared the Creative Labs Nomad Muvo 256MB MP3 Player.*

<sup>2</sup> *Carlos, Gina and Margo shared the Gateway 4-in-1, 64MB Music Player.*

ticipate.

A total of seven high school teachers participated in this study. All teachers worked at the same school. Four were social studies teachers, one was a media specialist (the school librarian), one was a modern language teacher (French), and one was special education teacher. The project coordinator (author) also participated with a primary interest in serving in a support capacity to other participants. The seven site-based participants were each asked to examine an MP3 player during a three-month trial period and participate in a subsequent focus group discussion. Participant profiles and assigned MP3 players are displayed in Table 3.

As the objective of this study was to examine potential classroom applications, a list of known MP3 applications was developed. The list was distributed to participants with the intent that it would prompt participants to validate what was already being done with MP3 players. Initial meetings with each participant stressed the exploratory nature of this study and the basic operation of MP3 appliances. Participants received new, unopened players in order to experience a new product to the greatest extent possible.

Participants were urged to explore the capabilities of the appliance and reflect upon any potential uses that may come to mind. Participants were asked to record their impressions about the devices and any ideas they may have with regard to potential classroom applications. The Project Director (author) met with participants as needed during the three-month trial and kept notes on emerging ideas.

#### *Focus Group Discussions*

A focus group format was used in this study because of its potential for exploring participant experiences, consensus, and questions and ideas (*Barbour & Kitlinger, 1999; Krueger & Morgan, 1993; Morgan, 1997*). Two separate mini-focus groups were organized and are referred to as *Focus Group 1* and *Focus Group 2*. The first group was made up of the four social studies teachers. The second group included the school media specialist, a modern language teacher, and a special education teacher. Each group met one time, for approximately one hour, during lunch. As moderator, the Project Director facilitated discussions by introducing a series of questions, interacting as needed within discussions, and by transcribing participant dialogue.

Discussions were cued with leading questions and statements that moved from broad to specific. Broad questions involved generalities regarding likes and dislikes about the MP3 players. More focused prompt questions and statements involved queries about specific applications of MP3 players. Individual responses were recorded as were perceived attitudes, reactions to peer responses, mind-changing, group consensus-making patterns and overall group dynamics. Narratives regarding potential applications were most important and involved follow-up questions. Critiques of narratives by other group members were also noted. Whenever required, individuals and groups were asked to restate or reiterate their beliefs. Restatements helped to clarify emerging ideas about applications.

Questions were sequenced to transition

from general to specific. Discussions were planned to allow for 10 minutes of general dialogue about participant impressions of their MP3 players; 15 minutes for discussions about application ideas; 10 minutes to review and react to Table 1 (*Literature Review: Potential Classroom Applications for MP3 Players*); and approximately 20 minutes of subsequent discussion on potential additions to Table 1.

An analysis of focus group discussions included comparisons and differences within and across groups. Responses and ideas were coded, organized into categories and connected to the applications listed in Table 1, where applicable, and to emerging ideas noted during preliminary discussions with individual participants. Data were reviewed and checks were made with several participants prior to the development of conclusions about potential MP3 applications. Written reports about general statements and findings from each focus group were assembled and are described as follows.

### Findings

#### *Focus Group 1*

Social studies teachers participating in Focus Group 1 included Carol, Jack, Chuck, and Steve. At Chuck's request the latter two participants shared an MP3 player. Chuck wanted to work with a colleague, due to what he described as his lack of knowledge about technology. His partner, Steve, was knowledgeable to the extent that he had prior experience with his own MP3 player. Carol and Jack worked independently with their own assigned MP3 players. It is noteworthy that each member

of Focus Group 1 was a teacher as well as a coach.

In response to the opening question about impressions of the assigned MP3 players, Jack reported on his discussions with his students when he announced to them that he would be participating in this study. He said that his students were very excited that he was examining technology that they were already familiar with. Several students offered to help him set up and use the player. Carol related that her first impressions revolved around her unfamiliarity with MP3 devices. She said that she had only heard of them and never actually used one before. Consequently she asked her husband to help her set up the player and become familiar with its various functions. Chuck reiterated his appreciation for Steve's help, and that Steve was much more knowledgeable about the appliance than he *ever* would be.

In response to transition questions about use during the three-month trial, Jack said that he became familiar with the functions of the player but used it primarily as storage media similar to a flash drive or memory card. Carol related that she used her player for music downloads. Chuck and Steve used the player for music as well. Steve downloaded some of his own MP3 files on to the player he examined.

Next, group members responded to two key questions. The first related to their ideas about classroom applications, and the second asked them to verify and supplement those uses identified in the literature and summarized in Table 1-*Literature Review: Potential Classroom Applications for MP3 Players*. Participants were given copies of Table 1 to examine

and refer to during this phase of the discussion.

*Classroom applications.* Responses to the first question centered on Jack's use of his player as a form of portable media. Jack and Carol related that their students have regular assignments, both short-term and long-term, that are currently completed at home and transported back to class by students on floppy disks or CD-ROMs. Both Jack and Carol suggested that PowerPoint presentations used in these assignments could be developed by students at home and transported back to school on MP3 players. Carol and Jack also related that they thought that student interest in exploring Web-based information would be increased by teachers who urged students to use non-traditional technology such as MP3 players. They both warned that school policy prohibiting the use of MP3 players during class time needed to be changed for this initiative to occur.

All participants related that by encouraging the use of MP3 players as storage media, students may be more likely to explore Web-based history sites that offer primary source materials and historic music pertinent to the history or government lesson at hand.

*Responses to Literature Review.* After the distribution of Table 1, participants spent several minutes reviewing the list of identified uses. All responded that for any of the uses to be realized *all* students would need MP3 players and that teachers would have to be adept at using them and problem-solving technology issues. Jack spoke for a need for site-based training, tech support, and an adequate budget.

Carol related her observations on *Recre-*

*ational Uses* and *Lecture Recordings* as they may apply to special needs students. She suggested that the use of MP3 players may indeed have a calming effect on special needs students as well as assist them with organizational requirements and note-taking. She related that such students could record classroom lectures on their MP3 players, download materials and handouts from the classroom computer, and listen to lectures while at home.

Jack recommended that important lectures and school events be downloaded to the school district's main server and accessed by students. He also suggested that students could use MP3 players to conduct interviews for oral history projects and listen to Web-based audio archives as extensions of history and government classes. Jack said that he already has students involved in a form of a *Podcasting* assignment. He currently asks students to prepare a *newscast* on their home computers and bring them into class on disk for presentation. He was excited about the prospects for student work to be presented to a wider audience by the use of podcasting.

Members of Focus Group 1 were also coaches; as such they were excited to read about applications derived from the literature about *Physical Education* and *Coaching*. Chuck and Steve related that their football budgets could already accommodate the purchase of the new generation of multimedia capable MP3 players. They related their belief that the editing of game tapes and distribution of multimedia files would have a positive impact on their team's ability to make real-time adjustments during a game. Steve suggested that

he could use a digital video camera to tape an opponent's defensive alignments and reviewing them with his offensive players immediately prior to a series of plays. He said that the capability for timely feedback would give his team an immediate advantage.

#### *Focus Group 2*

Carlos, Gina and Margo shared the Gateway 4-in-1 MP3 player. In response to my opening question about their impressions of the device they stated that the device was difficult to use. They appreciated working together to help each other use the player and to explore its capabilities. They said that training and support would be essential if teachers would be expected to use this device. When queried about using the device during the trial period, Margo and Gina said that they often deferred to Carlos for assistance in interpreting the instruction manual.

*Classroom Applications.* In response to the first key question about classroom application, Margo expressed a concern about the small size of the player and the potential for theft. As a special education teacher she saw several other less problematic applications for her students. She was especially interested in exploring the potential for downloading audio books. She reported that her students represented a spectrum of reading levels that are difficult to accommodate with standard classroom texts. She said that MP3 access to Web-based audio books, stories, and multimedia would better meet the needs of her students. Margo saw applications for non-readers as well. She described the potential for a wider use of audio materi-

als if she and her students had access to MP3 players and Web-based sites offering books on tape and audio archives such as National Public Radio. She related that audio files appeared to be useful alternatives to texts and would better accommodate the differing needs of her students. Margo reiterated that Internet connectivity and tech support were prerequisites if any meaningful use of MP3 players was to be achieved.

Gina, in her capacity as a French teacher, suggested that her lessons would be enriched through the use of an MP3 player's music playback capabilities. As an example, she said that she currently plays her rather limited French music collection to supplement language instruction. Gina was excited about the potential to connect to the multiple French language, culture, and music sites available on the Internet. She said that she wants her students to have access to a broader range of materials that are more representative of the cultural diversity inherent in world language instruction.

*Responses to Literature Review.* Carlos, as director of the school's media center, sees many applications for MP3 players congruent with what the literature review indicates. He reiterated Margo's recommendation for a larger collection of audio books, and said that the library should function as the instructional center of the school. His responses to my transitional query, in terms of classroom applications, paralleled key questions regarding uses identified in the literature and outlined in Table 1.

Carlos discussed the compression of large files into MP3 format and the poten-

tial for the storage of numerous files in the school media center. He related that the media center should be the primary storage and distribution point for an array of instructional materials and archived school events. He said that he would like to develop a large MP3 archive of instructional materials that included audio files, multimedia files, and other authentic materials. These would include, he suggested, oral history files, historic radio programs, and multiple forms of music and voice collections. Carlos said that as the repository for school archives, the media center should contain records of school events, plays, musicals, photographs, meetings, student presentations and research. He would also like to see student projects recorded on an MP3 format and preserved in the media center. Examples of student materials he cites as having high potential to be archived includes documents, exemplary creative works, concerts, poetry readings, and presentations. He would like to see student collections retained in an electronic format so that students can use them to build resumes and portfolios. Finally, Carlos in his capacity as Media Center Director, cautions that it is always recommended that users comply with any copy write restrictions applicable to proprietary recordings.

Carlos recommends that an investment in MP3 technology would be warranted by the array of potential applications and savings of physical storage space. He would like to see an investment in an archival system and server that would permit all of these alternatives to be realized. In summary, Carlos stressed that an investment in contemporary technology, such as MP3 players, would help promote student imag-

ination and creativity.

### **Discussion and Implications**

This study examined the potential for integrating a form of popular technology into the high school curriculum. While MP3 players are ubiquitous among students and touted by the media, the pedagogical questions that prompted this project have been explored by examining the literature and through a preliminary exploration of potential classroom applications. The teachers who participated in this study made recommendations that validated emerging uses and made important recommendations towards the integration of MP3 players in authentic teaching and learning situations. In summary, findings indicate two overarching themes.

#### *Curriculum Integration*

Teacher creativity and an apparent student-centered orientation, contributed to fluent discussions about MP3 player applications. Participant ideas paralleled nearly all of the applications extracted from a review of literature. In many ways participants were able to extend the applications into ones having deeper context to unique lessons. Their insightfulness permits a vision of applications that is contextualized in existing lesson plans, instead of being seen as superficial add-ons of another new technology or pedagogical trend. Teachers seemed to grasp the imperative of matching a new form of technology with an appropriate lesson. There were also indications that some participants were keenly aware of the potential for MP3 players to better match the learning styles and unique needs of certain sets of students. This is

particularly evident in the comments of special education teacher Margo. Jack and Carlos also seemed especially adept at viewing the technology as a tool that they predicted would enhance student creativity, options and outcomes.

Notably lacking from discussions were connections to curriculum standards and assessments that would indicate some correlation with standards. While teachers are increasingly required to connect teaching to state standards, focus group discussions were not designed to query participants' knowledge of those connections. It seems likely that a standards-based technology plan would need to align curricula with specific content standards and technology standards. An additional option that may clarify this gap would be to incorporate a backwards design process into the integration of MP3 technology in the classroom (Wiggins & McTigh, 1998).

#### *An Effective Technology Plan*

The teacher-participants in this study related that they have all had experience incorporating technology into teaching. However they qualified this by saying that the levels of support they had received differed according to several factors. For them, the results of technology infusion were mixed and varied in proportion to budget, political will, and time availability. If an MP3 player initiative was to be adopted, the consensus of opinion among participants was oriented towards the need to develop a comprehensive and sustainable technology plan. Training and support models that may achieve this objective have been outlined by the International Society for Technology in Education and offer a

comprehensive, research based model for professional development and technology support (Cradler & Cradler, 2002). These recommendations include many of the same recommendations and initiatives suggested by the participants in this study. These include the development of a shared vision for technology infusion, focused training, sustained technical support, and team collaboration. These findings were best reiterated by Carlos, as he advocated a structure that placed instructional technology at the core of the media center's mission to the school.

#### *A Vision of Technology Literacy*

Admittedly, conflicting tensions exist among teacher educators, teacher practitioners, curriculum specialists, school administrators, students, and the media industry over the educational uses and integration strategies of MP3 technology. Students especially, may recognize that school technology is light-years behind the devices and appliances they have at home. However some degree of unity among stakeholders may be realized in a shared vision of what a technology-rich learning environment may permit in the way of student learning and outcomes. While it may be unreasonable for teachers to be familiar with every new form of technology, the digital divide between students and their teachers may be mitigated through the investigation of emerging teaching and learning tools.

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