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Passive vs. active technologies in the classroom

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PASSIVE VS. ACTIVE TECHNOLOGIES IN THE CLASSROOM

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Abstract

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Modern Technology is being implemented in the classroom more and more. Little has been done to identify which types of technologies are the best to use for educational purposes. Research has shown that students perform better when they are interested in the subject. This study seeks to determine if passive technologies (TV, power points, etc.) or active technologies (video games, electronic quizzes, etc.) inspire more effective in inspiring interest and better performance. This will help educators chose better options for technology use in their classrooms. This study required subjects answer a survey questions regarding different types of technologies they had used in the classroom. The survey was administered to 40 under graduate students at Rowan University. The survey consists of likert scale (1-5) questions that evaluate how effective a student found a particular way in which technology was used in their classroom. Half the questions were categorized as pro-active and half were categorized as pro-passive. Technologies that required active participation (i.e. typing a response or using a buzzer to answer questions or pressing a button) were categorized as "active" and technologies that required only passive participation (i.e. watching or listening) were categorized as "passive". After collecting the data it was analyzed using repeated measures within subjects design. The study resulted in a null hypothesis suggesting that there is no difference between the ways these two types of technology effect classroom performance

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Chapter 1

Introduction

Review of the literature for the present study has demonstrated that students perform better when motivated using things that they are interested in. The current population is very interested in the new technologies being produced. Educators have already been clued in that implementation of these technologies will help in education and have started using them. The question now is: How do we narrow down the technologies that are most effective?

Naeghel, Keer, Vansteenkiste and Rosseel (2012) conducted a study in an attempt to clarify the relationship between reading motivation, reading self-concept, reading behavior (i.e., engagement and frequency), and reading performance (i.e., comprehension). Exploratory and confirmatory factor analyses indicated that both recreational and academic reading motivation comprise 2 factors: autonomous and controlled motivation. Structural equation modeling confirmed that recreational autonomous reading motivation is associated with more positive reading behavior and better performance. Students were found to read better and have better understanding if the student read on their own without encouragement. Students that like to read are better readers.

Renaud-Dube et. al. (2010) attempted a study to find that higher autonomous environmental motivation (i.e., acting out of choice and pleasure) is associated with the frequency of environmental behaviors such as recycling, paper reuse, and energy conservation. Results showed that adolescents' autonomous environmental motivation

was associated with more frequent environmental behaviors. The students that were more interested in the environment naturally were more likely to engage in pro-environmental activities.

These two studies demonstrate a strong correlation between interest and motivation. Motivation as demonstrated has a strong correlation to achievement. The answer to how to motivate students lies in what intrinsically motivates them. What are our students interested in?

Anderson et. al. (2012), recognizing the growing interest in social media, posed and attempted to answer some pertinent questions associated with the most popular social media site, Facebook. These questions were all posed form a psychologist perspective. Their answer to the question of how to measure Facebook use was generally that no reliable way has been developed. This is possibly because social media is still too new to have a norm measurement set up yet. It was also found that mostly young people are using the site and that older people may be having trouble switching to the new form of communication. It was found that most users of Facebook have a need to feel connected to other people. Networking sites have become the future of sociality and educators must embrace this to continue being relevant with younger generations.

Czaja et. al. (2006) has found that differences between generations in their use of technology could become potentially problematic unless technology use is encouraged more. The article reported findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE) on the use of technology among community-dwelling adults. The sample included 1,204 individuals ranging in age from 18–91 years.

Findings indicated that the older adults were less likely than younger adults to use technology in general, computers, and the internet. The results also indicate that computer anxiety, fluid intelligence, and crystallized intelligence were important predictors of the use of technology. The relationship between age and adoption of technology was mediated by cognitive abilities, computer self-efficacy, and computer anxiety. Educators in the older generation still must be able to communicate with the students of the younger. The younger generation's means of communication has changed and there is a growing communication barrier between traditional education and modern students. Educators need a better understanding of what technologies are relevant to their students.

Educators have recognized the need to use new technologies in their classrooms. This has resulted in a wide diversity of technologies being used in the classroom. Some are more interactive than others.

Barnett, Corkum & Elik (2012) conducted a study to determine whether a web-based medium is an effective tool for supporting knowledge, attitude, and behavior change in teachers of elementary school children with attention-deficit/hyperactivity disorder (ADHD). Teachers' knowledge positively changed after the intervention, as did teachers' attitudes related to perceived control in their classrooms and competence in teaching. The study demonstrated that a web-based medium is a useful tool for knowledge creation and translation and has potential as a means of providing professional development to teachers about ADHD.

Anetta (2010) took a serious look at how video games could be utilized as a tool in education. According to the research, six elements are required in the design of a feasible educational game. First, students must feel a sense of identity. Without first giving the player a unique identity, the subsequent five elements of SEG (serious educational game) design are not as impactful because students become less invested in the rest of the game content. Second, being immersed in these SEG environments means that players have a heightened sense of presence through individual identity, are engaged in the content, and thus are intrinsically motivated to succeed in the challenge of the game's goal. Third, games must allow players to be social communicators, whether it is with other players in a multiplayer environment or with the machine, communicating with computerized agents who are considered non-player characters (i.e., characters in the game not controlled by any human player). Fourth, good games often have multiple levels. The game must get harder or more complex as you progress. Fifth, the game has to provide a score. This is essential for an educator to monitor progress. Sixth, and most obvious, the game must teach a useful skill.

One method of using technology in the classroom has been the use of distance learning. This means classes that have an on line component. Whether our students are sitting in the room with us as we teach, sitting in their home listening, participating by video-conference, or answering discussion questions on an online platform, technology can play a pivotal role in student learning. Distance learning has some ups and downs that have been pointed out to us (Apena, 2012). The internet is endless information and essentially a million instructors in one. It teaches so many lessons at the same time, makes information to be available on various field of learning including the dictionary

meaning and pronunciations. This technology allows universities to give learners opportunity to learn from experts recruited from all over the world. A learner is not compelled to learn at a particular time since whatever the instructor does is not recorded on a student's computer. The benefits to distance learning do have some downsides. Online classes have the highest dropout rate because learners may not be computer literate. In countries that don't have the best access to electricity or satellites, getting assignments and test done on time can pose a problem (Apena, 2012).

With all the options of different technologies that are being used in classrooms, educators may have a hard time finding the most effective (Zhao, 2009; Whitaker, 2007; Wetzel, 1994; Vaughn, 2007; Talbert, 2009; Spooner, 2009; Spaniol, 2006; Renes, 2011; Ravoi, 2003; Ozdemir, 2007; Owens, 2009; O'Brian, 2011; Musick, 2001; Mortensen, 2000; McNeil, 1991; McMurray, 2007; Majeski, 2007; Ludlow, 2002; Lawson, 2007; Kermidas, 2007; Ke, 2009; Fletcher, 1989; Fletcher, 1990; Czaja, 2006; Crow, 2008; Chaney, 2008; Carnevale, 2002; Bosco, 1986; Barrnett, 2012; Appana, 2008; Apena, 2012; Annetta, 2012 & Akram, 2012) . The present study will effectively divide the technologies into the two groups; active and passive. Active technologies are technologies that students play an active role in. These technologies include games, online chat rooms, Web quizzes, etc. Passive technologies only require a student to participate passively. These technologies include video, power point slides, recorded lectures, etc. If educators are able to determine that one of these categories is inferior to the other it will help with their decision in selecting a technology to be used.

Studies have shown that motivation is a key component to learning and understanding a subject and students tend to be motivated with things that they have an

interest in (Renaud-Dube, 2010; Neaghel, 2012 & McGill, 2012). Society as a whole is clearly interested in modern technologies and is ready for them to be utilized in everyday life (Anderson, 2012; Crosier, 2012; Czaja, 2006; Hagner, 2001; Moore, 2008; Pea et. al, 2012; Prensky, 2001 & Rogers, 1995). Educators have already begun using modern technologies in their classrooms (Zhao, 2009; Whitaker, 2007; Wetzel, 1994; Vaughn, 2007; Talbert, 2009; Spooner, 2009; Spaniol, 2006; Renes, 2011; Ravoi, 2003; Ozdemir, 2007; Owens, 2009; O'Brian, 2011; Musick, 2001; Mortensen, 2000; McNeil, 1991; McMurray, 2007; Majeski, 2007; Ludlow, 2002; Lawson, 2007; Kermidas, 2007; Ke, 2009; Fletcher, 1989; Fletcher, 1990; Czaja, 2006; Crow, 2008; Chaney, 2008; Carnevale, 2002; Bosco, 1986; Barrnett, 2012; Appana, 2008; Apena, 2012; Annetta, 2012 & Akram, 2012). Little research has been done to try and narrow down the technologies being implemented.

Modern technology is being used in schools in most cases effectively. The present study looks at what are going to be defined as passive learning technologies and active learning technologies and which of these students find to be more effective. The hypothesis is that students will find more interactive or "active" technologies to be more effective than passive technologies. Participants will fill out a survey with questions about how effective they find a particular technology being utilized in the classroom. Scores will be tallied for each technique that will fall into either the passive or active category.

Chapter 2

Literature Review

Educators today are always looking for better ways to motivate their students. The following research demonstrates information that educators may find useful. First, students are better motivated by things that they are intrinsically interested in (Renaud-Dube, 2010; Neaghel, 2012 & McGill, 2012). Second, society as a whole has a growing interest in new technologies (Anderson, 2012; Crosier, 2012; Czaja, 2006; Hagner, 2001; Moore, 2008; Pea et. al, 2012; Prensky, 2001 & Rogers, 1995). Last, these technologies are being utilized in the classroom in a number of ways to help students (Zhao, 2009; Whitaker, 2007; Wetzel, 1994; Vaughn, 2007; Talbert, 2009; Spooner, 2009; Spaniol, 2006; Renes, 2011; Ravoi, 2003; Ozdemir, 2007; Owens, 2009; O'Brian, 2011; Musick, 2001; Mortensen, 2000; McNeil, 1991; McMurray, 2007; Majeski, 2007; Ludlow, 2002; Lawson, 2007; Kermidas, 2007; Ke, 2009; Fletcher, 1989; Fletcher, 1990; Czaja, 2006; Crow, 2008; Chaney, 2008; Carnevale, 2002; Bosco, 1986; Barrnett, 2012; Appana, 2008; Apena, 2012; Annetta, 2012 & Akram, 2012). Educators have their work cut out for them choosing amongst the wide array of technologies offered to them.

From a self-determination perspective, researchers attempted to replicate previous findings suggesting that higher autonomous environmental motivation (i.e., acting out of choice and pleasure) is associated with the frequency of environmental behaviors such as recycling, paper reuse, and energy conservation.(Renaud-Dube, 2010) Researchers also compared students' level of autonomous environmental motivation with their level of autonomous academic motivation. Results showed that (1) adolescents' autonomous

environmental motivation was associated with more frequent environmental behaviors and (2) autonomous motivation was higher in the environmental than the school domain. (Renaud-Dube et. al., 2010)

Self-motivation through interest has been shown to improve performance in a number of subjects including reading. The Naeghel et. al. (2012) study develops and validates the SRQ-Reading Motivation, a questionnaire measuring recreational and academic reading motivation based on self-determination theory. The study clarifies the relation among reading motivation, reading self-concept, reading behavior (i.e., engagement and frequency), and reading performance (i.e., comprehension). Participants included 1,260 Flemish fifth-grade students and their 67 teachers. Exploratory and confirmatory factor analyses indicated that both recreational and academic reading motivation comprise 2 factors: autonomous and controlled motivation. This factor structure was found to be invariant across boys and girls. Comparisons of the SRQ-Reading Motivation with subscales of the Motivation for Reading Questionnaire (Naeghel et. al., 2012) provide evidence for the construct validity of the instrument. Structural equation modeling confirmed that recreational autonomous reading motivation is associated with more positive reading behavior and better performance. In the academic setting, only the equivalent relationship between autonomous reading motivation and leisure time reading frequency could be corroborated. In this respect, the results confirm the independent contribution of recreational autonomous reading motivation and reading self-concept to reading behavior and performance.

Education has taken advantage of society's interest in technology by incorporating it in new ways. The latest technique of creating and disseminating

information using digital technology is the transformation the world is experiencing since the beginning of this millennium and it is what is being referred to as Information and Communication Technologies (ICTs) (Apena, 2012). These are modern tools (cable satellite, the internet telemetric applications) that facilitate the circulation of ideas and bring people together. ICT is defined as a diverse set of technological tool and sources used to create, disseminate, store and manage information. It is a technology that manipulates and process information and at the same time facilitates communication among people. The ICT can be used to promote social development and also facilitates teaching-learning process as it affects the open distance learning. (Apena et. al., 2012)

As we begin teaching "digital natives" (Prensky et. al., 2001) in our college classrooms, teacher educators are facing technology advances that challenge our ability to keep pace while simultaneously working with a new generation of learners. In recent years, teacher educators have witnessed the rapidly increasing impact of computing and web-based technology in its various forms on instructional methods in both the K-12 and the university classroom. Parallel to this proliferation of instructional technology over the past few decades has been the rapid expansion of distance education programs that have substantial relevance to teacher educators preparing special educators in rural or remote communities (Spooner & Lo, 2009). Many teacher educators involved in this transition may feel bombarded by the trends toward web-based learning and the ongoing arrival of a younger techno-generation of students whose expectations for engagement via multi-media technology in a lesson exceeds earlier generations (Prensky et. al., 2001).

The computer as an example of ICT is a million instructors in one. It teaches so many lessons at the same time, makes information to be available on various field of

learning including the dictionary meaning and pronunciations. The use of ICT has made the traditional world of paper obsolete. Traditional library involves the use of millions of books and shelves, which occupy space. In some areas, the shelves are filled with outdated books. The introduction of on-line electronic libraries and CDs by ICT is a great improvement on information, organization and retrieval in libraries. Learners access different landscapes, museums, libraries and any other places on the screen while staying in a place with the effective use of interactive CDs. (Apena et. al., 2012)

Technology has removed the limitations of time and space (Ke and Xie 2009; Lawson 2007), and the number of students who can "attend" a college class has increased dramatically. Over 3.2 million students took at least one online class during the fall term of 2005 (Ozdemir and Abrevaya 2007). According to the National Center for Education Statistics (2008), "In the 2006-07 academic year, 66 percent of the 4,160 2-year and 4-year Title IV degree-granting postsecondary institutions in the nation offered college-level distance education courses". (Renes & Strange, 2011)

Hybrid classes combine face-to-face learning and online learning (Vaughn 2007); typically, some of the time spent in the classroom is reduced but is not eliminated. Owens et al. (2009) studied the experiences of current and former distance students located in remote areas in Australia. The authors interviewed 49 non-indigenous graduate and undergraduate students who had completed distance education courses between 2003 and 2007. Following thematic analysis, three areas emerged as significant: (a) students often experienced a sense of isolation, (b) students were affected by the attitudes and knowledge of the teaching staff, and (c) students needed an understanding of and ability to use the required technology. The main theme was the amount and quality of interaction

between the student and the institution. Frequent communication with caring and supportive individuals helped deter feelings of isolation while the perception of being treated differently, and not as well, as the students on campus undermined their distance learning experience. These conclusions parallel what other studies have shown (Ravoi and Barnum 2003).

The students taking advantage of educational opportunities made available by new technology include (a) students with physical disabilities (Crow 2008; McNab 2005; Musick 2001; Spaniol et al. 2006), (b) students in rural areas who would find it difficult to relocate (Chaney et al. 2008; Majeski and Stover 2007; Owens et al. 2009; Ozdemir and Abrevaya 2007), (c) parents with children who find it difficult to leave the home (Carnevale 2002; Ke and Xie 2009), (d) military personnel serving their country in remote locations (McMurry 2007), (e) students working full time who have no flexibility in their schedule (Talbert 2009), and (f) urban students who find it easier to time-shift rather than space-shift (Whitaker 2007; Zhao et al. 2009).

One reason institutions are increasing their distance education opportunities is that students are requesting it (Appana 2008; Moore 2008). Students want the flexibility that distance delivery offers, allowing them to combine work and school demands. Ke and Xie (2009) looked at the learning performance of students participating in online courses. Fifty one students aged 24-59, majoring in nursing, business, or education and enrolled in ten online courses participated in the mixed method study. All of the study's participants attended an American research university and were taught by instructors who had an average of five years of online teaching experience. All participants, regardless of age, demonstrated a high level of satisfaction with online learning although the older students

adopted a more comprehensive approach to learning compared to the younger students. The study's findings also showed that for adult students, organized course content with student support, facilitated shared knowledge construction and student satisfaction. (Renes & Strange, 2011)

The goal of Barnett, et. al.'s (2012) study was to determine whether a web-based medium is an effective tool for supporting knowledge, attitude, and behavior change in teachers of elementary school children with attention-deficit/hyperactivity disorder (ADHD). Nineteen teachers from Nova Scotia, Canada completed a 7-week intervention that consisted of presentations, web links, and discussion board activities related to different aspects of ADHD. Teachers' knowledge positively changed from pre- to post-intervention, as did teachers' attitudes related to perceived control in their classrooms and competence in teaching. The study demonstrated that a web-based medium is a useful tool for knowledge creation and translation and has potential as a means of providing professional development to teachers about ADHD. (Barnett et. al., 2012)

Streaming video has been a significant development in the enhancement of web-based learning experiences. Streaming video involves an audio/video presentation that can be "broadcast" to a computer via the Internet and provides a continuous feed of video information either pre-recorded or live rather than downloading a large video file (Mortensen, Schlieve, & Young, 2000). Streamed video can be particularly beneficial for non-traditional learners due to flexible accessibility (Ludlow & Duff, 2002) and relates well to a younger generation of learners. O'Brian et. al. (2012) found that college-age students found the use of streaming video to be superior to the use of static images and overall more engaging. More significantly, the students reported streaming video to be a

better fit for their learning style (O'Brian et. al., 2012). This shows to be a great way to enhance online learning.

Computer-based technology is an interactive instructional approach in which the computer, taking the place of an instructor. For some people CBT is equivalent to a program that provides self-paced student instruction, tests and learning feedback with very little or no feedback from the teacher (Akram et. al., 2012). The Akram et. al. (2012) study was designed to analyze the perception of teachers in using CBT (Computer-based technology) at higher levels of education and to get opinion about the application of CBT. The study was descriptive in nature therefore a survey method was selected to collect the data. A questionnaire was used as research tool to collect the data. The questionnaire was administered to the 100 teachers of The Islamia University of Bahawalpur. Mean score was calculated for overall level of agreement/disagreement for each statement. For mean score norm was 3.00. However level of agreement was different for each statement. On the basis of data analysis finding and conclusions were drawn and recommendations were made. It was recommended that teachers need more training and awareness about the use of computer-based technology. Proper computer-based learning tools might be provided for the betterment of teaching-learning process. (Akram et. al., 2012)

Interactive video is the term typically used in the literature to refer to computer-based video that allows the learner to interact with the media (i.e., stopping to read overlaid text, replaying segments). Rather than passively viewing an instructional video on television or in class with an instructor playing clips, interactivity indicates the learner's ability to control the video and monitor his/her own learning (Wetzel, Radtke, &

Stern, 1994). Although technologies change over time, the interactivity of video in most studies is comparable to the level of interactivity involved in a web-based course using streaming video. Numerous meta-analyses, predating contemporary tools, exist in the research literature indicating positive effects of interactive video, including at least moderate effect sizes when compared to traditional instruction (Bosco, 1986; McNeil & Nelson, 1991; Fletcher, 1989; Fletcher, 1990).

At North Carolina State University, students and scholars are working to create a video game authoring platform where teachers and students can create their own games that align with content standards in science, mathematics, and technology education, although the platform is usable in many other domains. This is not a new idea but rather a recycling of many proven educational theories and practices into the video game world. (Anetta et. al., 2010)

These findings show that these advanced technologies are effective and therefore here to stay. Despite this indisputable fact, some educational settings believe they'll pass. Often, when confronted with rapid advances in computer technology, many in educational settings attempt to weather the changes with hopes the fad will fade away; however, the integration of computer technology into our daily lives is unlikely to diminish in the coming years. To be successful amidst these changes, teacher educators should actively engage technology in their professional work. (O'Brian et. al., 2011)

Vaughn (2007) referred to any change in postsecondary education as analogous to the "turning of the Titanic" (p. 91). Rogers (1995), a theorist and writer on the subject of how members of social systems adopt innovations, used specific labels to

describe the adoption of new technology. "Innovators" and "early adopters" are those who initiate the use of new technology while "early majority" and "late majority" adopters need an introduction to the innovation and compelling evidence that shows how it will address an immediate need. "Laggards" are those who are non-adopters. Hagner and Schneebeck (2001) interviewed 240 faculty members and identified four groups that depict the various motivations to use technology in teaching: the entrepreneurs, risk adversives, reward seekers, and reluctants. Hagner and Schneebeck identified the risk adversives as the largest group and described its 206 Innov High Educ (2011) 36:203–213 members as often lacking in technical expertise, afraid of new teaching environments, and hesitant to engage in self-examination, but able to benefit from peer demonstrations showing the effectiveness of technological innovations. (Renes & Strange, 2011)

A group of students well suited for education in these new formats are digital natives (Keramidas et al. 2007), which is a term for individuals who have grown up around technology, appear comfortable with it, and benefit from what it has to offer. Digital natives are often taking courses from digital immigrants, instructors who did not grow up around technology and who often struggle with adapting their teaching to the available formats. Using technology to assist in learning is not a foreign concept to digital natives and other students well versed in technology, as they do not view it as separate from their own lives or their own identities. They see technology as a natural extension of themselves (Schrader 2008). With their cognitive engagement so immersed in technology, they find learning about, from, and with technology an obvious choice for higher education. As more and more students are entering higher education as digital

natives, future research involving course design in distance education should consider their learning preferences. More familiarity with the student audience and carefully considering the student perspective when designing courses will likely improve student learning (Shattuck 2008).

The development of engaging and effective lessons for today's students involves appealing to their technological strengths. Focusing on multi-media components and virtual interactivity will provide the learner an opportunity to connect to the material in a way that is more familiar and natural than traditional means. The ability of teacher educators to be proficient with technology and develop a wide range of skills in order to reach today's learners is essential. (O'Brian, 2011)

The previous research leads into the current study's focus. The research established that motivation is a very important factor in determining how well a student is going to perform. It has also demonstrated the burgeoning interest and motivation in today's society for newer technologies. It leaves an opening for this study to find which technologies students are more interested in using in the classroom. If looked at from a self-determinative perspective, technologies that students are more interested in will serve them and their educators better in their quest for better academic performance. The types of technologies used in classrooms can be generally distributed into two categories: passive or active. Which of these two types do students better respond?

Chapter 3

Methods

Sample

Participants were 49 under graduate students collected from the Rowan University campus in Glassboro, NJ. The mean age of participants was 21.4 years. There were 32 women and 17 men.

Materials

The experiment consisted of a survey developed for this study by the researcher. The survey consists of 5 point likert scale questions that evaluate how effective a student found a particular way in which technology was used in their classroom (Appendix A). Half the questions were categorized as active and half were categorized as passive. Technologies that required active participation (i.e. typing a response or using a buzzer to answer questions or pressing a button) were categorized as "active" and technologies that required only passive participation (i.e. watching or listening) were categorized as "passive". An example of an active question would be, "How effective have you found educational video games to be in holding students' attention or how effective do you think they would be?" the participants then circle a number from 1 to 5, 1 being not very effective and 5 being very effective. An example of a passive question would be, "How effective have you found power point presentations to be in the classroom for holding student's attention?" participants then fill in the same likert scale 1-5. The survey consists of six questions total, three active and three passive. Before the survey participants also

fill out a demographics form with standard demographic questions (race, sex, age, etc.). (Appendix B)

Design

The experiment used repeated measures within subjects design. The independent variable was the type of technology usage described, either active or passive. The dependent variable is the score given by the participants to each technique.

Procedure

The researcher first handed out a consent form that all participants were required to read explaining the intent of the study. The researcher also read this aloud to the participants. The survey, along with a basic demographics questionnaire, was then handed out. Participants were given approximately fifteen minutes to complete the survey. Once the survey had been completed by the participants it was then collected. Scores for active questions were averaged together for each participant and scores for passive questions were then averaged together for each participant. The scores were then run through a two-way analysis of variance (ANOVA) for repeated measures.

Chapter 4

Results

The hypothesis was that there would be a significant difference between responses to the two question types (active vs. passive). To test the hypotheses, a two-way analysis of variance ANOVA was conducted on participant's scores from the passive and active type questions as within-subjects factors. An alpha level of .05 was used for statistical tests. No significant effect was found. A null hypothesis was found for difference between passive (M = 3.5882, SD = .5826) and active (M = 3.418, SD = .77742) questions.

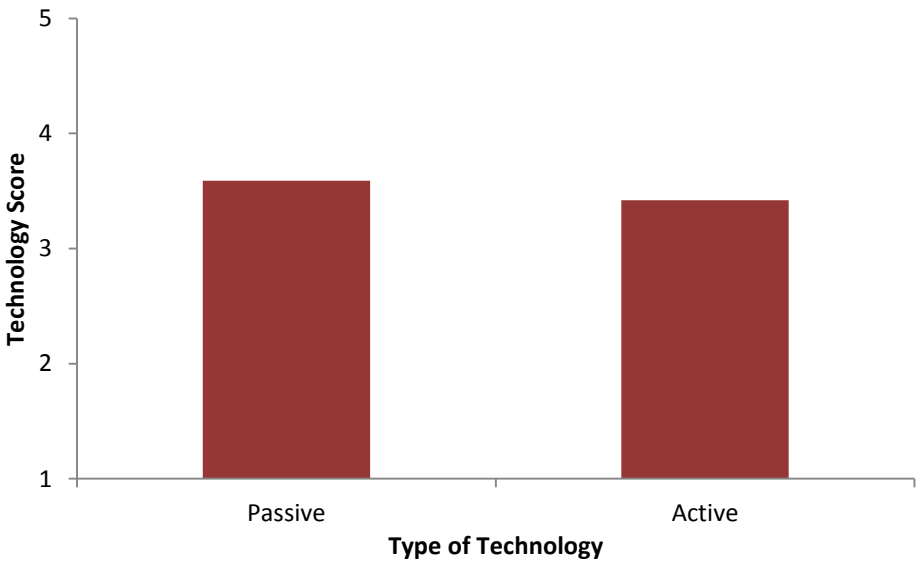

Fig. 1 Scores

Chapter 5

Discussion

Conclusion

This study sought to find a way to help educators determine which technologies are found to be most effective by students. The results were obtained through distribution of a survey to participants whose responses were then run through an ANOVA to determine if there was a significant difference between the question types: active and passive. This study found that there is no difference between the effectiveness shown for active or passive technologies as they were defined by this study. Students appear to be equally interested in either of these technology types. A better system will be needed to differentiate between technology sub groups to help educators make better decisions about which technologies are better to implement in the classroom.

Students are better motivated by things that they interested in (Renaud-Dube, 2010; Neaghel, 2012 & McGill, 2012). Not just students but, society as a whole has a growing interest in new technologies (Anderson, 2012; Crosier, 2012; Czaja, 2006; Hagner, 2001; Moore, 2008; Pea et. al, 2012; Prensky, 2001 & Rogers, 1995). There are many ways that educators are tapping into this intrinsic motivation for technology (Zhao, 2009; Whitaker, 2007; Wetzel, 1994; Vaughn, 2007; Talbert, 2009; Spooner, 2009; Spaniol, 2006; Renes, 2011; Ravoi, 2003; Ozdemir, 2007; Owens, 2009; O'Brian, 2011; Musick, 2001; Mortensen, 2000; McNeil, 1991; McMurray, 2007; Majeski, 2007; Ludlow, 2002; Lawson, 2007; Kermidas, 2007; Ke, 2009; Fletcher, 1989; Fletcher, 1990; Czaja, 2006; Crow, 2008; Chaney, 2008; Carnevale, 2002; Bosco, 1986; Barrnett, 2012;

Appana, 2008; Apena, 2012; Annetta, 2012 & Akram, 2012). There must be a way to find the most efficient and effective ways to use these technologies for education.

Reflection

The number and type of participants may have played a factor in the null hypothesis result. Only 49 subjects were given the survey to score the results of this study. A larger number would have been better for extrapolation to the wider population. The range of ages was 14 years. The technologies that were focused on in the survey questions would have had varying degrees of impact to different age groups that would be dependent upon when an individual was first introduced. An age range of 14 years is probably too large of a gap and a focus on a specific age range would be wise for future research. Another variable to consider is gender. There were almost twice as many women that participated as men (17 male, 32 female). Perhaps there is a difference in interest of new technologies between men and women. If women are less interested in technology this could certainly account for the null hypothesis result.

The way the research was conducted could be flawed. This research was fairly novel and all procedures were original. It is possible that the means by which the results were gathered is flawed in some way as they have not been previously shown effective. The questions on the survey may not be appropriate or effective in assessing what was trying to be measured. A different survey could be developed that has more direct questions. A likert scale was used primarily for ease of scoring but perhaps this type of questioning is not appropriate. An open ended style of questions may give more insights into which technologies are preferred and why. Granted a test of this type would be more

difficult to score but the in depth answers might be more valuable for assessing technology use in the educational setting.

One confounding variable may be that this new class of college undergraduates is not as interested in the technologies mentioned in the survey as previous classes might have been. All of the previously mentioned studies happened during a time period where the technologies in question were new and innovative. It takes time for new technologies to be introduced in an educational setting because they have to go through trial testing. By the time students are exposed to them regularly enough, perhaps the novelty of the technology has waned. If this is the case then the validity of all such testing needs to be re-evaluated. Testing of students' interests in technologies and even the effectiveness of such technologies in the classroom tends to be when the subject technology is new and perhaps found to be more interesting.

Barring these concerns, it appears that the active vs. passive divide is nonexistent. If this is the case then perhaps there are different divisions in technologies types that could be assessed. Perhaps a divide between more personalized technologies and group technologies exists were a personalized technology is one you participate in by yourself and group technologies are ones that a whole group participates in together.

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Appendix A

Survey

1. Do you enjoy the use of interactive educational games? (1= not at all, 5= very much)

   1 2 3 4 5

2. Does watching a program about a subject help you better understand that subject than a text book would? (1= not at all, 5= very much)

   1 2 3 4 5

3. How effective have you found videos to be in the classroom for holding students attention (1= not at all, 5= very effective)?

   1 2 3 4 5

4. How effective have you found power point presentations to be in the classroom for holding student's attention (1= not at all, 5= very effective)? 1 2 3 4 5

5. How effective have you found educational video games to be in holding students' attention or how effective do you think they would be (1= not at all, 5= very effective)?

   1 2 3 4 5

6. How effective have you found electronic quizzes (students usually have a hand "buzzer") to be in holding students' attention (If you have never experienced this how interesting does it sound?) (1= not at all, 5= very effective)?

   1 2 3 4 5

Appendix B

Demographics

Age: _____

Sex: M F

Ethnicity: White Black Non-White Hispanic

East Asian Pacific Islander Native American

Middle Eastern Other

Education: Highschool Diploma/ GED Associates

Bachelors Masters

PhD Other

Generally speaking, how comfortable do you feel using a computer?

Very comfortable Somewhat comfortable

Not very comfortable Not at all comfortable

How often do you use the Internet?

Once or more a day A few times a week

A few times a month Hardly ever

Never