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ePortfolios: Helping Students Take Control of Their Learning

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A young girl in the first grade brings home all of her work to show her mother what she has learned during the year. Giving the folder to her mother, she is filled with pride and joy as to what she has accomplished during the year. Her mother flips though her work and she swells with pride as she notices the growth her young daughter has made. A high school graduate sits in a lonely waiting room as he waits for his first ever job interview. He tightly grips his binder that contains his best work from high school. Once he enters the interview, he is able to present actual artifacts that show his qualifications for the job. Portfolios have been used in education for quite some time allowing students to save and to reflect upon their artifacts that they created as learners (Tzeng &Chen, 2012). With the onset of new technology and its use in education, these portfolios can now be created electronically. Students can save their learning artifacts in an online portfolio that can be used to: (a) show they have met state standards, (b) show they have the necessary skills for employment and (c) reflect upon their journey as a learner and how they enhanced their knowledge. Because of pressure from school administrators to increase test scores and the implementation of the Common Core standards, which require teachers to design more student centered learning, a debate has sparked amongst teachers in a rural Northwest Georgia school as to whether these two ideas can coexist and both be successfully implemented. In order to help answer some of these questions, research will be conducted to determine if a student-centered environment, where the student creates an electronic online portfolio, can improve student content knowledge in economics. Economics is a course that students in the rural Northwest Georgia school system must pass as a senior in order to graduate from high school. Economics is the final social studies class a student must take in order to earn all four of

their social studies credits, and the last opportunity that the social studies instructor has to teach the students Twenty-first century skills.

In 2001, the Unites States Federal Government passed the No Child Left Behind Act. This act was intended to raise student performance and close the achievement gap amongst schools (Lagana-Riordan & Aguilar, 2009). The state of Georgia responded to this legislation by creating and establishing the Georgia Performance Standards (Obara & Sloan, 2009). The idea behind performance standards is to prove that students have mastered the content for the discipline in which they are studying (Kubinia, Amato, Schwilk & Therrien, 2008). One way to show mastery is the student's performance on standardized tests; another way is to actually examine the learning artifacts that the individual student created. An ePortfolio is one way that students can organize their learning in order to show that they have mastered various performance standards (Pecheone, Pigg, Chung & Souviney 2005)

Electronic portfolios are a critical piece of Twenty-first century learning. They allow students to save their work for future reflection and self-promotion. They also signify an instructional paradigm shift from teacher centered instruction to student centered instruction, meaning students will have the responsibility of obtaining the content.. ePortfotlios will also help teach students Twenty-First century skills that are needed in order to be successful in the future of the job market. This study is important because is has the potential to influence instruction for students in the future.

Purpose of the Study

In the current public school setting, there is a huge emphasis placed on standardized test scores. These test scores are to indicate whether individual schools are performing to a standard set forth by the local governing bodies and the federal government (Dutro & Selland, 2012).

These test scores are intended to determine if student knowledge is at a satisfactory level indicating that educational professionals have taught students the required standards and that students are prepared to progress to the next grade level in their educational journey. Though testing is important, tests miss much of the big picture for the student (Griffith 2012). In Economics students are required to take an end of course test that is created by the state of Georgia in order to measure how much they have learned. However, the test does not provide the student with anything to show their learning other than a numerical score. With ePortfolios students can create learning artifacts that demonstrate that they are gaining the necessary skills and content knowledge without the use of high stakes testing. This begs the question; to what extent do ePortfolios increase cognitive performance in Economics? Therefore, the purpose of this quasi-experimental study using a pretest/posttest design is to compare the differences in cognitive learning between a group of high school seniors being taught economics using ePortfolios and a group of high school seniors being taught economics via traditional teacher centered methods at a rural Northwest Georgia high school.

Research Question

In order to determine if there is an increase in cognitive learning in economics through the use of electronic portfolios for high school seniors at a rural Northwest Georgia high school the following research question was asked:

Is there a difference between the test scores of students who utilized economics instruction through electronic portfolios and students who utilized economics instruction in a traditional manner?

The electronic portfolio group or experimental group received instruction in manner that consisted of online lessons in which they built their own knowledge of the content and stored the

artifacts they created in an electronic portfolio. The students who received the traditional treatment received instruction by teacher, lecture and student worksheets in order to obtain the content required by the standards.

Significance of the Study

This study can potentially impact K-12 education. If students' content knowledge can be improved through the development of an ePortfolio, teachers might be more inclined to develop more student centered learning environments. This would allow the teacher to become more of a facilitator of learning rather than the sole source of student learning. Classrooms can become places where students are in control of their own learning and the teacher will become more of a guide rather than a "sage on a stage." As an Economics instructor for the past ten years, I believe this study will allow the teacher to truly create instruction that is best for the student a more student centered approach.

Key Terms and Definitions

The following terms are important to this study:

- *Common Core*- The Common Core are standards set by the National Governors Association in order to ensure all students are being taught information and skills that are relevant to the Twenty-first century.
- *Concept Map*- A concept map is a graphical tool that is used to show relationships between different ideas. This tool can be used to help organize and visualize different ideas.
- *ePortfolio*- Also known as an electronic portfolio, it is a collection of artifacts that the student has created. These artifacts are collected and organized according to the standard in which it met.

- *Georgia Performance Standards* -The standards that will help guide the creation of the electronic portfolio are the State of Georgia Performance Standards; specifically in the subject of Economics. The students will create their ePortfolio in a wiki.
- *Wiki* – A wiki is a website that will allow users to take control of what content is placed on that website. A wiki can be accessed on any computer with an Internet connection. This will allow students the freedom to work on their assignments outside of the school setting.

Literature Review

The adage that one learns by doing applies more to educational culture than ever before (Liang-Yi, 2009). With the creation and mainstreaming of the Internet it has never been easier for students to construct their own knowledge. One way students can demonstrate that they are learning is to collect what they have learned and assignments they have completed and display them in a portfolio. A portfolio is a collection of artifacts that a student creates in a class in which he or she is participating. (Foote & Vermette, 2001). One method a student can use to collect artifacts of his or her learning is electronically. According to Hsueh-Hua "electronic portfolios differ from traditional portfolios in that information is collected, saved, and stored electronically, possibly using a variety of multimedia formats" (2010, p.214) As technologyimproves, electronic portfolios, or ePortfolios, are becoming more and more popular (Kirkham, Winfield, Smallwood, Coolin, & Wood, 2009). The onset of new technology like ePortfolios can impact students in a manner that will help them grow as a learner through self-reflection and self-evaluation (Peacock, Gordon, Murray, Morss, & Dunlap, 2010). However, it is important to examine the influence of ePortfolios on curriculum and student learning from different viewpoints; therefore, this review will focus on the following themes as a guide of the

examination of literature: (a) the implementation of ePortfolios and how they help students construct learning, (b) the impact of ePortfolios on the curriculum, and (c) general issues with ePortfolios.

Evidence of Learning

Constructivist learning theory "rests upon the assumption that knowledge is constructed by learners as they attempt to make sense of their experiences" (Driscol, 2005, p. 287). According to Clemmons (2006), when learning with constructivism "the student is instead urged to construct questions and seek out possible answers" (p. 20). Constructivism promotes learning because by encouraging students to use critical thinking and problem solving skills in order to gain the required knowledge; constructivism simply means that the students must take ownership in their learning (Blaik-Hourani, 2011). One way for students to take ownership of their learning is to have them assemble artifacts of in a portfolio (Buzzetto-More, 2010).

According to Foote and Vermette (2001), a portfolio is a collection of artifacts that the student has created over time. At the collegiate level, various programs of study are requiring future teachers (Granberg, 2010), doctors (Lewis & Baker, 2007), and nurses (Williams, et al., 2009) to develop a portfolio of their work. In these types of portfolios, the young professional gathers artifacts that best chronicle their journey as a learner and professional (Fitzpatrick & Spiller, 2010). One way these young professionals can store their learning artifacts is electronically, which is called an ePortfolio. ePortfolios are becoming more and more popular in the domain of education. Another tool, or instrument, in which a student can create an ePortfolio is to use a blog (Hsueh-Hua, 2010) or a wiki (Florea, 2008). These tools allow students to prove they have performed exemplary on various projects or assignments by embedding any artifacts they have created, or link to artifacts they have created that are located on the World Wide Web.

Many of the tools a student can use to create an ePorfolio are located online and are easily accessible. Students can continuously update their portfolios as they progress through the learning process. ePortfolios are simple tools students can use to monitor and measure their learning as well as their performance.

This idea of monitoring and measuring learning and performance is evident in a teacher's professional portfolio. Creation of a teacher's portfolio allows the educator to reflect on his or her journey and analyze what teaching methods or activities were successful and what methods or activities need to be reworked. Ayan and Seferoğlu (2011) found that a teacher's portfolio gives "participants a sense of ownership, fostered reflecting thinking, supported collaboration and allowed them to make connections between theory and practice" (p. 513). In other words, it allows the teachers to grow professionally (Chitpin & Simon, 2009). Not only do portfolios help teachers reflect upon their teaching practices but electronic portfolios can also improve teachers' technology skills. Electronic portfolios help teach educators the necessary skills needed to create the portfolio, and it fosters the creativity to create technology based assessments for their future students (Ntuli, Keengwe & Kyei-Blankson, 2009). Seeing the benefits of portfolios in the improvement of teachers, it begs the question: What could the impact of portfolios be on K-12 students?

One way to measure learning at the high school level is through the use of concept maps. Concept maps allow for a graphical representation of organized knowledge (Nousiainen, 2012). These maps show links between important concepts that can, in return, show that the student has made the necessary connections with in the material that is to be learned (Lee & Segev 2012). Concept maps have been widely used to help organize and show improvement in students'

knowledge (Po-Han, Gwo-Jen, & Milrad, 2012). Concept maps will be used in this study to show same things.

Concept Maps play many roles in education. Villalon and Calvo (2011) use concept maps to scaffold complex information. Lee and Segev (2012) use concept maps to help student pull valuable information from text. Finally, Jeng-Li (2011) proves that concept maps help with the development of student's mental reasoning. These studies show that using concept map to measure leaning is a viable way of assessing student's gain in knowledge.

Implementation of ePortfolios

The implementation of ePortfolios has the potential to impact curriculum in a manner that could change the way educators approach teaching and learning. Educators will be able to design different learning experiences for students; these learning experiences will allow students more freedom in their learning. It will also allow teachers to assess students in a way that is different from multiple-choice tests (Fitch, Reed, Peet & Toleman, 2008) As assessment tools, ePortfolios can be used in a variety of ways: (a) they can be used as formative tools because they will allow teachers to monitor student work as students progress; (b) the teacher can discuss with the student not only the content that is to be learned, but also the technical skills that the student will develop as he or she completes his or her ePortfolio, (c) and they can be used as summative assessments as teachers grade the final product subjectively according to a grading rubric at the end of a course or unit (Fitch, Reed, Peet, and Toleman 2008).

The Impact of ePortfolios on the Curriculum

Fitch, Reed, Peet and Toleman (2008) studied the impact of ePortfolios on the participants of the social work program at the University of Michigan. The authors wanted to know how useful ePortfolios were as not only student assessments but also as assessments of the

curriculum. They concluded that ePortfolios were a good measure of the participant's competency as a social worker and ePortfolios were a quality assessment of the curriculum. Fitch, et al. (2008) concluded that when developing an ePortfolio, "students developed as "self-authors" who integrated competencies across courses, connected course knowledge and skills to field work, and engaged in ongoing self-reflection and peer review process" (p.51). Through the development of an ePortfolio, students can not only learn and perform the required standards and material but they can also become more confident as learners.

ePortfolios can also benefit and improve student self-efficacy. Graham (2011) defines self-efficacy as "the belief in one's ability to carry out specific tasks successfully" (p.113) Through a reflective process, students are able to monitor their learning as they progress through the content. Students are able to look back at what they have created and get a sense of what they have achieved. This sense of self-achievement can grow as students reflect upon their learning artifacts. With this improvement in self-efficacy, students have the potential to improve performance on objective assessments, some of which are mandated by the state. An improvement in self-efficacy was seen in the study conducted by Rees & Sheard (2004) in which they surveyed medical students at the University of Nottingham about the creation of their medical portfolio. In this study, it was determined that there was a positive correlation between the student's optimism of the reflective process by creating a reflective portfolio.

ePortfolios not only help assess students but they can also help assess the teacher as well (Shepherd & Skrabut, 2011). Through ePortfolios, a teacher's course management becomes more evident as he or she can provide actual student artifacts to show that the teacher is creating authentic assessments; this is evident in technical schools where students are using portfolios to collect competences-based artifacts as they perform realistic performance task (Sluijsmans,

Straetmans, & van Merriënboer, 2008). Teachers are able to show that they are using their time more efficiently and that they are creating student-centered activities while reminding the teacher that the portfolio is as much about the teacher as the learner (Cassel 2000). As the student grows as a learner, the teacher gains a better idea of the needs of the student because the activities that the student completes will more than likely be graded subjectively. This gives the teacher more of an idea of how the student is progressing, and what strategies he or she need to use in order to get student learning to where it needs to be (Black, Harrison, Hodgen, Marshall, & Serret, 2010). Once a teacher feels he or she can easily assess student learning, he or she feels more comfortable implementing interactive teaching methods such as ePortfolios (Ozder, 2011).

ePortfolios can be implemented at all levels of learning. At the collegiate levels, ePortfolios are being used to qualify young teachers who are to become the future of the educational work force (Chitpin & Simon, 2009). Fitzpatrick and Spiller (2010) researched the implementation of portfolio as an assessment tool of pre-service teachers at the University of Waikato in Hamilton, New Zealand. In this study, they found that portfolio assessments were instituted when several frustrated professors were looking for a new way to assess their education students. Through their discussion, these professors decided to use portfolios as their new form of assessments. Their findings were that the creation of the portfolio was a passionate process that in the end reaffirmed the student's and the university's view of him or her as a teacher.

At the high school level, students can create eportfolios to show that they are ready to perform at the collegiate level. Acker and Halasek (2008) studied high school students who were able to participate in a joint effort between his or her high school and the local college. These students completed a writing portfolio that was reviewed by both the college instructor and their

high school teacher. This study found that students who had their work reviewed by both the high school teacher and the college professor improved their writing skills according to the rubric and improved their chances of success in collegiate setting. Likewise, ePortfolios can also be used in technical education in order to show potential employers artifacts that the student has successfully completed. Visual art students and students in other design classes, such as a web page design class, can gather their artifacts in order to show the work they have completed so that they can reflect on themselves as a learner and also market themselves to potential employers or colleges and universities. The idea of a portfolio, whether it is in a binder or stored electronically, is to showcase the process and the person completing the artifacts (de la Harpe, et. al, 2009).

At the middle school level, students benefit from portfolios because they learn by doing rather than learning by listening. Lockledge (1997) suggested that portfolio learning for the younger students was challenging at first. However, with encouragement from the teacher, they were able to find success through the reflective portfolio process. This raises the question: How young is too young to use portfolios as assessments? There is a dearth of literature regarding the use of using portfolios with elementary students. However, there is extensive research on elementary teachers using portfolios to develop teaching skills. Koshinen & Valencia (1994) suggested that elementary teachers should portfolio students' work in order to reflect upon their own teaching practices. This reflection process creates a scenario where both the student and the teacher would benefit from the reflective aspects of a portfolio.

ePortfolios can benefit student learning in many ways. First, ePortfolios help students construct their own knowledge. Students have to search for knowledge and process that knowledge in order to finish many of the projects that become artifacts within their portfolios;

Secondly, students personalize their own learning process; this means that ePortfolios help create lifelong learners (Heinrich, Bhattacharya, & Rayudu, 2007). Sturmberg & Farmer (2009) suggested that portfolios allow for depth of knowledge while completing real world exercises that build the foundations that lead to a "capable, reflective and life-long learner" (p. 85). Thirdly, students are in charge of their individual learning. ePortfolios do not allow students to hide behind bashfulness. Instead, student learning is on display for all to see and judge (Diller & Phelps, 2008). This display of learning requires students to become more reflective of their education (Chambers & Wickersham, 2007). In order to prove that portfolios require students to become more reflective in their learning Chambers and Wickersham (2007) studied Masters students as they embarked on the portfolio-assessment process over a two semester time period. During the first semester, the students were unsure of the portfolio process. However, after they became familiar with the technology used to create the portfolio, they saw the portfolio as an advantage because it allowed them to analyze work they created as a learner. The reflective process requires students to be critical of their completed artifacts to ensure they have achieved the required learning goals set forth by the teacher. It also requires them to reflect upon the quality of their work in order to ensure they have met all the qualifications in order to earn a good grade.

Finally, ePortfolios teach students the proper digital literacy skills that help them succeed in the twenty-first century. O'Brien and Scharber (2008) define digital literacy as "the composition and reading of multimodal texts" (p. 66) and also suggest that digital literacy is constantly changing as the technology that people use changes as well. Clark and Visser (2011) stated that the National Broadband Plan (2009) suggested that digital literacy is something that can benefit all Americans. With that being said, ePortfolios can be created online, and this will

help students develop skills by learning with things such as HTML, cloud computing, and development of Web 2.0 skills (Florea, 2008). These digital literacy skills help students in their future whether they attend college or enter the work force because these skills help them adjust to the always-changing technology.

Potential Issues with ePortfolios

Though ePortfolios can benefit students at all levels of education, there are potential issues with portfolio learning. For example, one potential issue would be whether or not high school, middle school, or elementary school students have the discipline to stay on task and complete the necessary learning artifacts in a timely manner. The concern for this is whether or not students will connect the ePortfolio with their learning (Wickersham & Chambers, 2006). This was evident in a study of first semester master's students conducted by Whickersham and Chambers (2006). After one semester of working with a portfolio as an assessment tool, students quickly became frustrated because they did not see how the portfolio connected to them as a learner. Much of this problem arose from the use of technology in which the student was unfamiliar. Though working with technology can cause discomfort among students, a lack of technology potentially prevents students from completing learning artifacts required for the ePortfolio in a timely manner. Also students in poorly funded schools districts and students from low-income families, face potential trouble gaining access to the technology needed in order to complete their ePortfolio. These students tend to fall behind in the acquisition of the digital literacy skills that are essential to complete their required learning artifacts (Kim et al., 2011). The cost of technology not only prevents students from creating quality ePortfolios. Also the cost of ePortfolios software prevents school systems from fully embracing them.

ePortfolios can also create administrative issues for schools. Underwood (1998) researched an ethnically diverse, low-income middle school on the West Coast that attempted to implement portfolio assessments. The students enjoyed the portfolio process, their writing scores improved, and the teachers were satisfied with the portfolio approach teaching practices. However, the system did not fully implement portfolios afterward because "there was local pressure to deliver instruction geared toward design principals of the standardized multiple choice comprehension test" (Underwood, 1998, p.182). Another administrative issue is the evaluation of the portfolio. Teachers who have never evaluated a student portfolio may have difficulty evaluating the portfolio that in turn would threaten the validity of the portfolio process (Weshah, 2010). The evaluation process creates more challenges for the teacher who is evaluating the portfolios. Tigelaar, Dolmans, Wolfhagen and van der Vleuten, (2005) stated, "a hermeneutic, interpretative approach to the assessment of teaching portfolios appears to be appropriate for teaching" (p. 606) and that this approach would "burden portfolio readers with a difficult and time-consuming task" (p. 607). These time consuming task, would include the meticulous grading of every student in all of the teachers classes, providing ample feedback to each student in all of the teachers classes, and allowing for students to improve and resubmit their projects, starting the process all over again.

With the hard work that both the teachers and the students put into the portfolio process, it raises the issue of who owns the portfolio: the teacher or the student? (Gearharat & Herman, 1998; Weshah, 2010) Does the student who created the artifact own the portfolio, or does the teacher who designed the curriculum own the portfolio? This is a very complicated issue and one that Ghaye (2007) would call an ethical issue of the reflective process.

By allowing students more freedom to control their own learning, teachers must let go of some of the control they have over the pace of the class. Teachers must rethink classroom management strategies and create environments that allow for students to take more control. Akar andYildirim (2009) suggested that in a constructivist learning environment teachers must rethink their classroom management. This applies to the constructivist portfolio approach that is becoming more and more popular.

Teachers must also learn to assess ePortfolios (Tigelaar, Dolmans, Wolfhagen & van der Vleuten, 2005). Rubrics help with this; however, the time required to grade final projects increases significantly. With this subjective grading approach, teachers must also monitor student progress to ensure that each student is learning the required material that they will see on state mandated tests. ePortfolios allow for depth of certain concepts, however it is the other concepts not covered in the portfolio that teachers must present the student with in order for them to be successful on standardized tests.

ePortfolios are becoming more and more popular at all levels of education. ePortfolios allow students to learn the required material with depth and self reflection. They also help students learn digital skills that will pay off in the future no matter what path they choose. Moreover, ePortflios allow students to be creative in their learning process. However, at the K-12 level, the growing importance of standardized testing requires teachers to closely analyze their teaching practices. Teachers are faced with pressure to ensure that their students perform well on these tests, yet still they must prepare them for higher levels of education and teach them skills that will benefit their future. There is a need for research that investigates whether or not eportfolios will improve student learning at the K-12 level while also increasing student

performance on standardized tests. ePortfolios are being used extensively in the college setting, but there needs to be research as to how ePortfolios affect K-12 students.

Method

This research employed a quasi-experimental design in order to examine whether or not there was a difference between the test scores of students who received instruction in economics through electronic portfolios and students who received instruction in economics in a traditional manner. The following research question guided this study: Is there a difference between the test scores of students who received economics instruction through electronic portfolios and students who received economics instruction in a traditional manner? The dependent variable in this study was posttest scores and the independent variable is the type of instructional groups.

The study involved two 12th grade economics classes in a quasi-experimental research design using an experimental and control group. A quasi-experimental design was employed due to fact that the groups were not chosen at random. Instead, these classes were scheduled and students were assigned to each respective economics class by the counseling department based on their needs to graduate high school. The two classes that were chosen for this research were two of three Economics classes the instructor lead in the spring of 2013. These two classes consisted of regular education students, which are students who do not require the assistance of another teacher as part of their Individual Education Plan (IEP). The two classes were similar in nature, and thus the reason they were used for this study.

The experimental group experienced learning through a more student-centered approach using ePortfolios. This student-centered approach allowed the student to take control of his or her own learning. The teacher acted more as a guide for the information to be learned rather than the deliverer of the information. The experimental group experienced learning through the use

of an online tool called Edmodo, a free online course management tool. The teacher loaded into the online course management tool links that directed the student to various online, constructivist lessons. The student created a learning artifact for each lesson which he or she embedded into their ePortfolio. This collection of learning artifacts allowed the students the opportunity to reflect upon their learning and potential growth as a student. Artifacts that the students created were presented using web 2.0 tools, writing assignments stored in a Wiki, and the participation in various online simulations.

The control group experienced learning through a more traditional approach, which was a more teacher-centered approach to learning. Learning under the traditional approach required the teacher to be the deliverer of information. This type of instruction consisted of teacher lecture, textbook readings, worksheets and more common forms of assessments such as multiple choice quizzes and tests.

All students in both groups received the same pretest and posttest. The pretest and posttest were the creation of a concept map of the subject the students were to learn, macroeconomics. The students' concept maps showed what they knew about macroeconomics before and after the treatment. This concept map was graded according to the rubric selected by the researcher shown in Appendix C.

Participants

The students who participated in this study were 40 seniors in their final semester of high school at a rural high school in Northwest Georgia. According to the Georgia Department of Education this school is predominately Caucasian while African American students make up the majority of the minority students in this school. Fifty-nine percent of the students are eligible for

free and reduced lunch and twelve percent of the students are qualified for the special education program. This means that over half of the student population lives in low-income families.

The teacher conducted this research with two different classes: group one, the experimental group, consisted of 22 students and group two, the control group, consisted of 18 students. Group one was made up of eleven females and ten males. That make up can also be broken down into three African Americans, three Hispanics and sixteen white/Caucasian students. Group two consisted of nine females and nine males. The racial make up was seven African American, two Hispanics and nine White/Caucasian students.

Data Collection

Data sources for this study include pretest and posttest scores for each instructional group. The pretests and posttests given to both groups are not 'tests' in the traditional sense. Instead, the tests involved students creating a concept map in order to demonstrate their knowledge of the subject. Students in both groups created a concept map before the instruction and created a concept map after they have received the different types of instruction. The rubric that was used for the grading of the concept maps was designed by the University of Minnesota (Appendix C). Points were awarded according to this rubric meaning they could earn a maximum of sixteen points, four rows and four columns.

This rubric guided the teacher in the grading the concept maps in order to bring validity and reliability to the research. Having another teacher grade the concept maps and comparing the scores provided a reliability measure for the test score (Goss, 2009). It is important to note the other teacher was a member of the high school in which the study took pace. This instructor also serves as the economics advanced placement teacher. If there were to be a difference between the two teachers scores of more than two points, the two teachers would discuss their

scores and a third teacher would be asked to score the concept map. The grader will not see the student name in order to guard against bias and to protect student confidentiality. Before the other teacher graded the concept maps they were briefly trained as how to use the rubric to grade the concept maps. The other teacher was informed that for every category the student earned excellent they were to receive four points, good three points, adequate two points and marginal one point.

Testing and Scoring Procedures

The procedures of the study consisted of the following steps: 1) The teacher had the students create a concept map as a pretest in order to gauge the student's knowledge of a subject; 2) The teacher then graded the concept map according to the concept map rubric, and had another teacher the other grade the concept maps according to the concept map rubric in order to ensure the test is valid; 3) Once the two teachers graded the concept map the two teachers compared the scores. If the scores of a particular concept map were than two points a third teacher would be asked to look over the rubric and concept maps and provide the researcher with another score, however this was not necessary because the scores were all with in one point of each other. This procedure would have repeated until a consensus has been agreed upon. The final scores of the rubric arrived by a consensus of the teachers involved; 4) The teacher administered the instruction to the students in the experimental group and the control group; 5) Finally, the teacher graded the posttest concept map and crosschecked with another teacher before the results were analyzed following the same procedure mentioned in step two. The final scores of the rubric were arrived at by a consensus of the teachers involved after both teachers graded the concept maps according to the rubric.

Once the concept maps were graded using the assigned rubric, the Means and Standard Deviations of the pretest and posttest scores for each group were reported. In order to show differences on adjusted posttest scores an Analysis of Covariance (ANCOVA) was used. In this ANCOVA the covariate was the pretest score because we wanted to measure the impact of the instructional condition found in the difference of the posttest score.

Reliability and Validity

Reliability was established through the use of an outside source, another teacher of the same subject, to cross check the use of the rubric to ensure the original teacher graded the concept maps. In order to ensure there was no bias from the instructor and to establish inter ratter reliability, another teacher who teaches the same subject also graded the students' concept maps. The same teacher ensured the statistics were calculated correctly, which brought reliability to the research. The teacher who crosschecked the concept maps teaches Advanced Placement Economics. He has taught that level for over thirteen years, and he has also graded the AP test as a reader for the College Board. This particular teacher teaches statistics and checked all statistical calculations to ensure the calculations were correct. This teacher was thoroughly trained on how to use the rubric in order to grade the concept maps. His training consisted of a close examination of the rubric and a description of the scoring system. The scoring system consisted of the student earning four points for excellent work, three points for good work, two points for adequate work and one point for marginal work. This process ensured that the teacher was able to grade the maps that are consistent with the research. The two scores that were provided by the two teachers involved were within one point of each other on three different pretest scores and five different posttest scores. After a final discussion among the two participating teachers, a final grade was given and the scores were averaged.

Validity was established by measuring content that is in direct relationship with the Georgia Performance Standards. The standards measured were the performance standards for Macroeconomics. Students completed an electronic portfolio over a period of three weeks. The portfolio consisted of learning artifacts created by the students that match the standards and the sub standards. The control group participated in teacher led lectures along with traditional multiple-choice assessments. Both groups created a concept map on the first day of the unit as a pretest and on the final day of the unit as a posttest.

Reliability and Validity of the study was also improved by bringing reliability and validity to the rubric that was used to grade the pretest and posttest concept maps. Goss (2009) used the concept map rubric used in this study to help measure whether or not understanding was being gained in an Earth Science class. Goss (2009) used two different concept map rubrics in her study, the University of Minnesota's and one provided by Inspiration. Inspiration was the the company that developed the lesson in which Goss used in her study. Though Goss (2009) declared the Inspiration was more valid for their study, it does not mention that the University of Minnesota's rubric as unreliable or invalid. Further investigation also showed that PBS encouraged teachers to use the University of Minnesota's concept map rubric with the grading of concept maps in their lesson The Journey to Palomar (PBS, 2008). To further gain reliability and validity the rubric was critiqued by Dr. Chris Bruton. Dr. Bruton received his Ph.D in Psychology from the University of Georgia and his thoughts on the rubric are "The rigor and complexity of graded response in the hierarchy of marginal thought through excellent assessment demonstrates the student's level of understanding and progression of learning" (Bruton, 2013).

Many attempts were made to contact professors from the University of Minnesota and the University of Iowa asking for information on reliability and validity of the concept map rubric

used in this study, however, these attempts were unsuccessful and did not return any such information.

Ethical Considerations

As a teacher who is already in the school where the research was conducted, there was easy access to participants and the learning environment. In order to conduct research, parents of students in each respective class acting as either the experimental or control group, needed to grant permission for their child to take part in the study. To gather parental consent, a letter was sent home to parents stating the goals of the research, how the study will be conducted, and asking for permission for their student to be a part of the study (Appendix A), also students were asked to sign a consent form in order to make them aware of the research and receiver their approval to be apart of the study (Appendix B). Also, the local county board of education was notified that research is being conducted and they gave their approval via a letter of cooperation with the researcher. Institutional Review Board (IRB) approval was gained before commencing the study. In order to ensure the safety of all parties involved, the materials and information gathered in this study were locked in a safe place in the teacher's classroom and all parties involved signed a confidentiality agreement.

In order to ensure that there was no undue influence each student was assigned a number. This number was placed at the top of the students concept map so that the teacher would not be influenced by who the student was and his or her past work.

Results

The teacher conducted this research with two different classes group one, the experimental group, consisted of twenty-two students and group two, the control group, consisted of eighteen students. Before either group was given any treatment, each group took a

pretest in which they created a concept map of Macroeconomics. The mean, according to the scoring of the rubric previously mentioned, for group one prior to treatment was a score of 4.9 with a standard deviation of 1.2 and the mean for group two prior to treatment was 5.1 with a standard deviation of 1.9. In order to see if the effects of the pretest were significant, a one-way analysis of variance (ANOVA) *F* test was conducted as shown in Table 1. The results of this test was Group*Pretest F=2.246, *p*=.143 Because the probability in the Group*Pretest is higher than .05 the interaction was not significant, meaning that the students knowledge of macroeconomics in both groups was similar before entering the treatment. This is typically called homogeneity of regression slopes, meaning the slopes of the lines of the groups are parallel.

Table 1

Tests of Between-Subjects Effects

Dependent Variable: posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	188.530[a]	4	47.133	15.940	.000
Intercept	11.172	1	11.172	3.778	.060
Group	14.768	1	14.768	4.995	.032
Pretest	121.404	1	121.404	41.059	.000
Group * Pretest	6.641	1	6.641	2.246	.143
Error	106.445	36	2.957		
Total	2903.000	41			
Corrected Total	294.976	40			

Following the test between subjects, a Levene's Test of Equality, which tests the homogeneity of variances, was conducted. As shown in Table 2, the amount of error in the dependent variable was not significant between groups (p=.282). This score means that any differences between groups is due to something other than error, or the treatment the students received.

Table 2

Levene's Test of Equality of Error Variances[a]

Dependent Variable: posttest

F	df1	df2	Sig.
1.311	2	38	.282

After the treatments were conducted the students were given the posttest. In the posttest the students were instructed to complete a concept map like they completed in the pretest. The estimated marginal mean, or unweighted mean for group one, the experimental group, was 8.6 and the estimated marginal mean, or unweighted, mean for group two, the control group, was 7.0 with a confidence interval of 95%. Results are shown in Table 3.

Table 3

Group

Dependent Variable: posttest

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	8.617[a]	.373	7.861	9.373
2	7.079[a]	.413	6.243	7.915

In order to determine the differences in the groups an Analysis of Covariance (ANCOVA) was conducted. The reason the ANCOVA was conducted was to measure the impact of the two different treatments, the student centered electronic portfolio approach and the traditional teacher centered approach. The group differences, seen in Table 4, was at the .05 level (F=4.501, sig .018). This means that differences between groups were considered significant at that level with the differences in the pretest taken into consideration. Because the treatment group scored higher on their posttest this means that the student centered electronic portfolio treatment was successful in improving students posttest of Macroeconomics.

Table 4

Tests of Between-Subjects Effects

Dependent Variable: posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	181.890[a]	3	60.630	19.837	.000	.617
Intercept	11.999	1	11.999	3.926	.055	.096
Pretest	161.525	1	161.525	52.849	.000	.588
Group	27.512	2	13.756	4.501	.018	.196
Error	113.086	37	3.056			
Total	2903.000	41				
Corrected Total	294.976	40				

Conclusion

When studying whether or not students' knowledge is improved through the use of electronic portfolios there must be several processes that must be in place before the study could be conducted again. Students must have more work with the use of concept mapping for assessment. It was found that students know of the process of creating a concept map, but the idea of using a concept map as an assessment was new to the students. Also, students need prior practice with the tools involved. It would be a good suggestion to take time prior to the treatment and teach students how to use the tools involved so that class time can be spent learning the material rather than the tools they are using to create the performance task. Though these were minor setbacks, overall the experiment was successful. Not only was knowledge of Macroeconomics improved but also the knowledge of several new online tools.

This study was limited by it narrow focus. In order to truly understand the impact of ePortfolios on education one must use this type of learning over a broader scale. Cross-curricular use of ePortfolios must also be use to analyze the impact of student learning. Though

the results in this study are in line with results from other studies a broader study would better correlate with these previous studies.

Another suggestion to improve this study would be use some type of multiple-choice test as a pretest and posttest. A multiple-choice test would give teachers who are not adverse in the thought behind concept maps a connection to the impact of the implementation of ePortfolios. A multiple-choice pretest and posttest would also help administrators understand that this would be a tremendous tool that could help improve the numbers that are now being used to judge schools and school systems.

Implications of this study could greatly influence the design of instruction in the area in which the study was conducted. The county school system where this study was conducted is set to roll out an online course management system, Blackboard, to its teachers and students in the fall of the year 2014. The results of this study could bring assurance of results to teachers who might be skeptical of this type of learning. This study could also serve as an example as to how to design instruction so that the student is in control of their learning. This study has the potential to significantly influence the learning of the students in this rural Northwest Georgia County.

Though the implication could greatly impact the county in which the study was conducted as a whole, there is one classroom in which the results of this study will be immensely impacted. That classroom is my classroom. As a teacher I witness first hand the enjoyment of the students participating in an environment in which they were comfortable. Students were relaxed and working at their own pace. It was also rewarding as their teacher to see the artifacts that they created and to hear the discussion amongst the students as they created those artifacts.

When one student made the statement that they thought this was a “cool” way to learn and that they “enjoyed” the experiment I knew I made an impact that could reach far beyond the schoolhouse doors.

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Appendix A

COLLEGE OF EDUCATION

DEPARTMENT OF INSTRUCTIONAL TECHNOLOGY

Dear Parent or Guardian,

A study will be conducted in your child's Economics class over the next few weeks. This study could potentially impact how instruction is designed for seniors who take Economics in the future.

If you give your permission, your child will have the experience of developing an electronic portfolio of their work in their Economics class. This portfolio will allow for reflection of their work and a potential tool that they can use to show the quality of their work.

Participation in this study is strictly voluntary. You may refuse to participate in this study and there will no penalty to your child. The risks of study are nothing more than any risk that would be encountered in everyday life. Your child also has the option to decline the study even if you give permission for them to participate in the study.

If you have any questions please feel free to contact me by email or by phone. My email address is adam.williams@bartow.k12.ga.us and my phone number is (770) 606-5845. My advisor is Randal Carlson. His email is rcarlson@georgiasouthern.edu and his phone number is (912) 478-

To contact the Office of Research Services and Sponsored Programs for answers to questions about the rights of research participants please email IRB@georgiasouthern.edu or call (912) 478-0843.

If you are giving permission for your child to participate in the experiment, please sign the form below and return it to your child's teacher as soon as possible. Thank you very much for your time.

Adam Williams

Instructional Technology Major

Randal Carlson

Dept. of Leadership, Information Technology, and Human Development

Professor of Instructional Technology

Investigator's Signature_____

Child's Name: _____

Parent or Guardian's Signature: **_____**

Date: _____

Appendix B

COLLEGE OF EDUCATI0N

DEPARTMENT OF LEADERSHIP, TECHNOLOGY, AND HUMAN DEVELOPMENT

INFORMED CONSENT FORM

My name is Adam Williams, and I am a student in the Eds. Program for Instructional Technology at Georgia Southern University, and I am a teacher at Cass High School. I am conducting a study about electronic portfolios and their impact on student learning. The purpose of this study is to show how a more student centered approach to learning can improve student's knowledge of a subject. This quantitative study will show potential gains in student knowledge by conducting a pretest and posttest of the subject at hand Economics.

The discomforts and risks from this study are minimal and are no more than would take place in everyday life and are considered minimal. .

The potential benefits of this study would be to design instruction that is more beneficial to the student so that the material learned is designed to be more student centered rather than teacher centered.

Participation is voluntary and may be withdrawn at any time.

In order to protect the s confidentiality of participants, a number not the participant's name will appear on all of the information recorded during the study and reported after the study. The results of the survey will be examined and shared with the school and professors at Georgia Southern University.

You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H_13391.

Title of Project: ePortfolios: Helping Students Take Control of Their Learning

Principal Investigator: Adam Williams Georgia Southern University

adam.williams@bartow.k12.ga.us

Faculty Advisor: Dr. Randal Carlson Georgia Southern University
rcarlson@georgiasouthern.edu

_____ _____

Participant Signature Date

I, the undersigned, verify that the above informed consent procedure has been followed.

_____ _____

Investigator Signature Date

Appendix C

UNIVERSITY OF MINNESOTA

Concept Map [Assessment Rubric]

criteria	Excellent	Good	Adequate	Marginal	no credit; is unacceptable to review
structure	non-linear structure that provides a very complete picture of your ideas	non-linear structure that provides a complete picture of your ideas	non-linear structure that provides a picture of your ideas	non-linear structure that shows some relationships between ideas	inappropriate structure
relationships	relative importance of ideas is indicated and both simple and complex relationships are very effectively mapped	relative importance of ideas is indicated and relationships are very effectively mapped	relative importance of ideas is indicated relationships are mapped	importance is evident but not very distinctive; relations are somewhat clear but lacking	no differentiation between ideas; no evidence of meaningful relationships
exploratory	map shows complex thinking about the meaningful relationships between ideas, themes, and the framework	map shows effective thinking about the meaningful relationships between ideas, themes, and the framework	map shows definite thinking about relationships between ideas, themes, and the framework	map shows some thinking about relationships between ideas, themes, and the framework	thinking process is not clear
communication	information is presented clearly and allows for a high level of understanding	information is presented clearly and allows for a good level of understanding	information is presented clearly and allows for a basic level of understanding	information is presented and some understanding can be gained	information is not clear, very difficult to understand