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Let Me Google That: The Effect of a Paperless Classroom on Student Engagement

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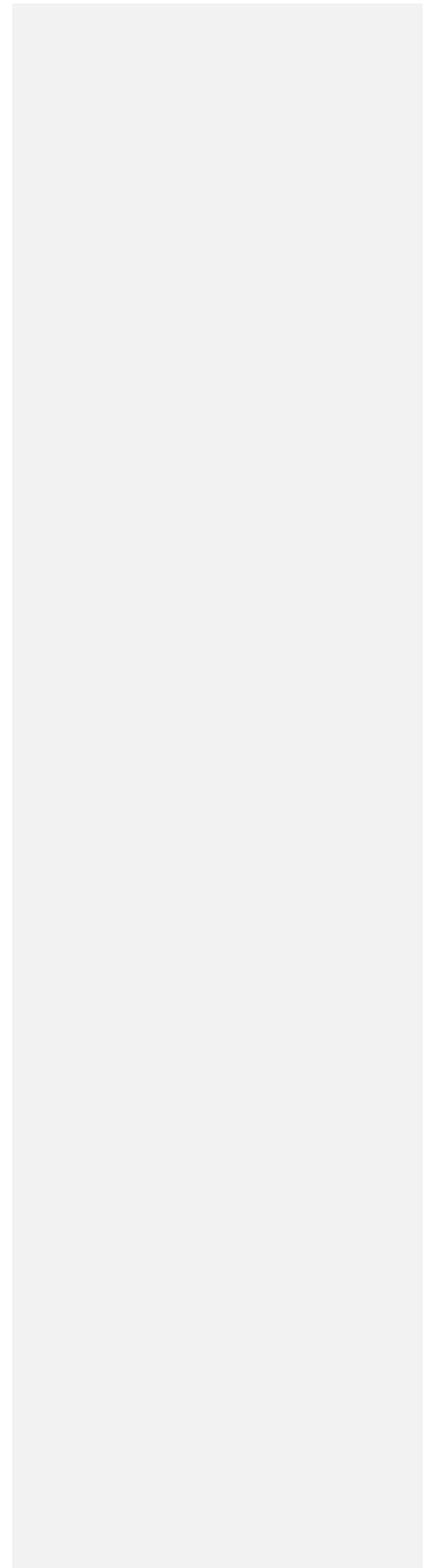
Abstract

There has been in increase in technological advances, however it remains unclear how technology in the classroom affects student engagement. The paperless classroom is a special point of interest in the classroom, because it involves a classroom where everything is done online. In this study I used student surveys and interviews to determine how engaging students felt the paperless classroom was.
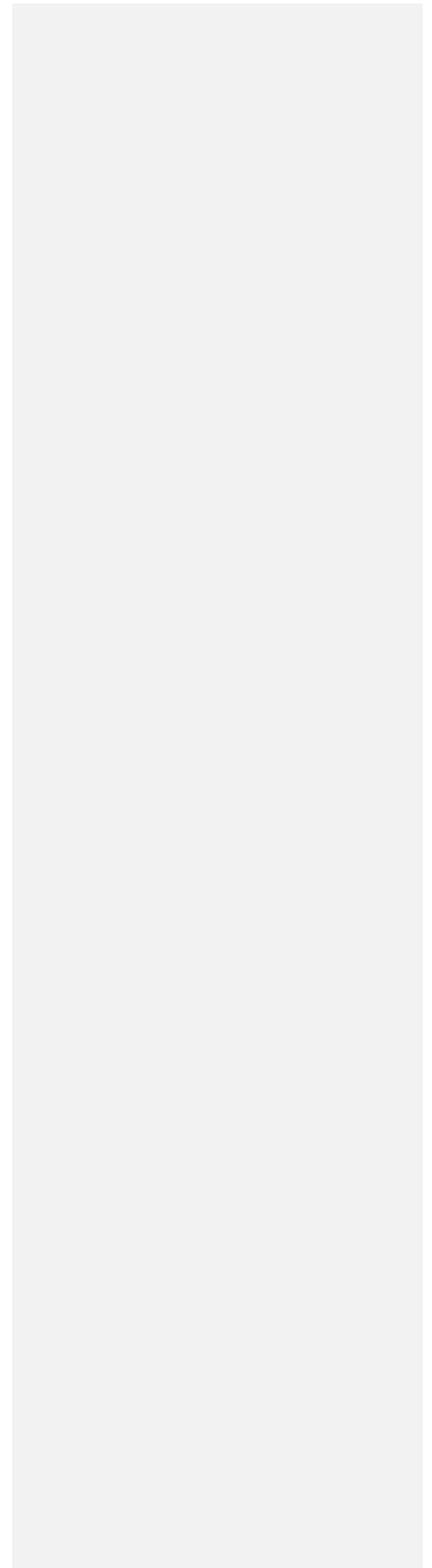
This study looked at what effect, if any, a "paperless classroom" could have on student engagement while considering the various roles technology plays. With technology being a developing field and increasingly more prevalent in the classroom there is a need to determine what effect, if any, the paperless classroom could have on student engagement. A paperless classroom is one in which the classroom uses no paper, because all reading and writing is done online. Primarily in these studies student engagement was measured through students' evaluation via surveys of how engaging the technology in their classrooms was (Eskicumali, 2015; Rahardjo, Juneman, Setiani,2013). In this literature review, several different types of technology were explored including communication technology which helps students respond to questions in class to different forms of social media.

Literature Review

In order to fully explore what, if any, effect technology could have on students, this review is organized in a way that explores what factors are involved. The focus of the first section is about different uses of technology in the classroom. In the second section it describes how teacher perspectives on technology could impact whether or not technology affects engagement in the classroom. The third section sets out to look at the use of technology in secondary English classrooms because there is a gap in the research that exists with the majority of studies focusing on upper level math classes instead of secondary classrooms.

Theoretical Background

Technology has become a large part of students' everyday personal lives, which has called into question what role it should play in the classroom. In a study by Gemmill and Peterson (2006) featuring 300 undergraduate students who were given a 70 question survey on technology and stress, they found that the stress technology caused was "negated by the disruptions caused by technology (p. 293)." However, they contend that, "students need some technological devices in their daily lives and school environment (p. 291)."

Use of Technology in the Classroom.

One use of technology in the classroom includes information and communication technologies. Eskicumalı (2015) defines information and communication technologies as

"technologies that are used in reaching information, storing that information, producing

information or making regulations on it, and transmitting this information to wherever we want

with the help of networks" he argues this is relevant since technology is more imperative now.

(p. 241). With more students using information technology systems in personal settings some

teachers are bringing the information technology systems into the classroom settings.

Online Polling.

One example of using technology in the classroom is through using polling in the

classroom because according to Noel (2015) there have been "advantages associated with

mobile-based polling" (Andergassen, Guerra, Ledermueller, & Neumann, 2013; Richards, 2009;

Shon & Smith, 2011). For mobile-based polling, "Signals are received from both cell phone text

messaging and browser-based devices such as laptops or tablets. Because Poll Everywhere offers

flexibility using both Wi-Fi and text-messaging technology, the terms used in the literature to

explain its platform are varied;" some experts rely on the web-based component while others

define it as mobile-based (Noel, 2015, p. 54). Taylor and Keeter (2010) argue that one reason to

apply technology to classrooms is students already view cellphones as something that is essential

(as cited in Noel, 2015).

Student stress with technology.

A study conducted by Eskicumali (2015) used the educational stress scale to indicate any

possible technology-induced stress on the middle school student participants. The educational

stress scale consists of factors such as workload, the worry associated with grades, self-

expectation, and despondency on a five point scale with one being strongly disagree and five

being strongly agree; with higher scores indicating higher levels of stress (as cited in Sun,

Dunne, Hou, and Xu 2011). Results showed that there was a positive relationship between

Variables	Informational	Research	Communication	Game	Self-ExpressionS.	Educational S.
Information	−					
Research	.58**	−				
Communication	.40**	.44**	−			
Game	.52**	.40**	.44**	−		
Self-expression	.44**	.41**	.36**	66**	−	
Educational Stress	.35**	.21**	.12**	.35**	.35**	−
Mean	48.4	13.1	8.9	14.56	7.5	5.4
Standard deviation	7.4	3.5	2.3	4.0	2.6	1.8

Table 1: Descriptive statistics and inter-correlations of the variables

$**p < .01$

students' educational stress and the level of their information technology use "despite students

thinking that if teachers use information technologies in teaching, topics will be more interesting

and enjoyable (Eskicumalı, 2015, p. 241)." Interestingly, different types of technology

corresponded with different levels of stress in students. Similarly, a study done by Erdem (2014)

found some variability in students' opinions on different technological methods in a blended

classroom. Although the class was primarily undergraduate students and was only conducted

using about 40 students it uses the Likert scale to compare student's views of technology.

Table1. Student's opinions on implementation and reliability results of BLE dimensions

	M	SD	Cronbach α
Ease of use of Web Environment	7.59	1.31	.84
Online environment	7.25	1.60	.84
Content	7.48	1.60	.94
Face-to-face environment	7.73	1.70	.92
Evaluation	7.62	1.92	.89
Blended Learning Environment	7.16	1.41	.88
Total	7.40	1.16	.94

In Table 1 above, information technology shows a correlation with higher levels of stress.

Eskicumali further says, "Despite the benefits of these devices, psychologists and educationists

are aware of the negative effects of them in terms of psychological and physical features"

(Greenfield, 2000). Other studies have supported this correlation between technology and student

stress (Gemmill & Peterson, 2006; Mark, Wang and Niiya, 2014; Rahardjo, Juneman, & Setiani,

2013).

Benefits of Technology.

Comment [1]:

Although some studies have found a correlation between technology and stress (Eskicumali, 2015; Gemmill & Peterson, 2006; Mark, Wang & Niiya, 2014; Rahardjo,Juneman, & Setiani, 2013) a study conducted by Noel found students had a more positive view towards technology. In Noel's study (2015) the study was conducted with university students, which is a very different population compared to secondary students. In the study, the university participants were enrolled in a leadership course where they were forced to use clickers at least twice and then were given a survey in which they were given the choice to participate. In this study participants gave positive feedback regarding their experiences using personal devices during mobile-based polling activity. When compared to previous literature, the results of this study seem to follow "similar trends of positive perceptions of polling among students...behaviorally, emotionally, and cognitively (Noel, 2015, p.65)." Similarly, Bitner and Bitner(2002) argue that early exposure to the technology that students will need to use for the rest of their lives will help them later in life (as cited in Eskicumali, 2015, p. 241).

Methods

Two classes were given an overview of the research project and if students were interested they were given assent and consent forms (Appendix B and C) to be signed by both the student and student's' parents or legal guardian in order to participate in the study and returned within two week's time.

Before beginning the study students were given a pre-survey, which used the Likert Scale to determine students past experiences with the paperless classroom, what activities students enjoy doing on the computer, and how students use the paperless classroom. This survey was also used to determine which activity students would want to try on paper. Responses were scored with strongly agree=5 to strongly disagree=1.

After converting responses to numerical values and averaging them it was determined that the majority of students wanted to try doing homework on the computer, so for 4 weeks students were given their homework only on paper. A sample vocabulary homework assignment was provided in (Apendix E).

After four weeks of having vocabulary homework, only on paper students were given the survey using the Leichert Scale, and answers were given a numerical answer and scored. Additionally student interviews were conducted to get individual students' perspectives.

This study set out to determine perceived student engagement using both quantitative and qualitative data. The goal for this research was to identify how doing vocabulary on paper changes student attitudes toward paper, by comparing their pre-survey. Likert Scale responses with their post-survey activity Likert Scale responses. The same 10-question assessment was used for both the pre-test and the post-test, with an additional 3 questions on the post-test. Additionally, students were interviewed after the post-test.

Participants

This study took place in a 7th grade English classroom in a rural middle school in Virginia. For this study the population was students in English 7 from both inclusion and regular English classes all taught by the same teacher. In this school, 49% are female and 51% are males. In the school 76% are Caucasian, 11% are Black, about 8% are Hispanic, less than 2% are Asian, and 3.6% identify as two or more races. In this school 21% of students have free or reduced lunch.

Of the 2 classes asked to participate, comprised of 53 students, 23 students participated in the study. Of the 23 students who participated in this study 60% were girls and 40% were boys. In the study 90% were Caucasian, 7% were Hispanic, and 2% were African American. Parents and guardians were asked to give consent and students were asked to give their assent for permission to use quotes and surveys from the students about their thoughts on technology in the classroom. Both the parents and guardians gave consent and the students gave assent for this study.

Measurement

Students were given a survey based on the Likert scale which is a scale from 1 (strongly agree) to 5 (strongly disagree) to determine student engagement. Questions in this survey included preferences about learning on the computer versus learning using paper to indicate student engagement with technology. Within the survey I wanted students to select certain tasks they prefer to do with technology and others they prefer to do on paper, if students believe that some tasks are better suited to certain methods. Students were selected to be quoted about their experience in the paperless classroom through a random number generator. Data was collected after I have started full-time student teaching.

Research Design

This was a mixed methods study with primarily a qualitative focus. Students were given a survey using the Likert scale. In the first part of the pre-survey, it asked questions about students' past experience with paperless classrooms and technology in the classroom, including how they prefer to learn. In the second part of the pre-survey it asked students about their current experience in a paperless classroom; again the questions asked how they prefer to learn as well as how they actually think they learn better. In the post-survey students were given the same questions as part two of the pre-survey as well as three additional questions to gain further background. The pre-survey and post survey responses were scored using 1-5 for strongly disagree to strongly agree and averaged. Changes were measured using a p value of .05 to determine significant change.

Procedure

Data was collected after I started full-time teaching for my internship and the time frame for this research plan was six weeks. First, all students were assigned a number and this number was used for the duration of the study (in both pre and post surveys as well as interviews.) Then I gave the survey to all classes after I had been in schools with them for one month. This survey was given at the start of class after the warm up but before the daily journal; if students finished the survey early they wrote in their daily journal. Additionally, students were selected based on a number generator to interview about their experience in the paperless classroom. I predicted students would find the paperless classroom beneficial for some tasks but not for others. The survey scores were averaged together in order to analyze them.

Results

Quantitative Analysis

I analyzed the results by using a *T*-test, and a *p*-value of .05 to determine statistical significance on the surveys to compare if the average scores change before and after. The questions were used to measure any potential changes in student opinions in the paperless classroom after having vocabulary on paper for 4 weeks. In answering about if they thought they focused well in the paperless averaged a 3.69 (between somewhat agree and agree) the first time and a 2.9 (between disagree and somewhat agree) the second time, which was shown to be statistically significant decrease (using the *p*-value of .05) in how focused students felt they were on paperless classrooms. Students enjoyment of the paperless classroom as well as enjoyment for doing readings on paper both had an insignificant increase from 4.09 to 4.7 and from 2.95 to 3.12, respectively. Students responded they preferred typing essays to writing them by an insignificant amount from 4.17 to 4.3. After having vocabulary on paper for four weeks, students' opinions went from 3.78 to 3.79, which was statistically insignificant. The pre-survey and post survey results can be seen in Figure 1 pictured below.

Figure One **Pre/Post Survey Paperless**
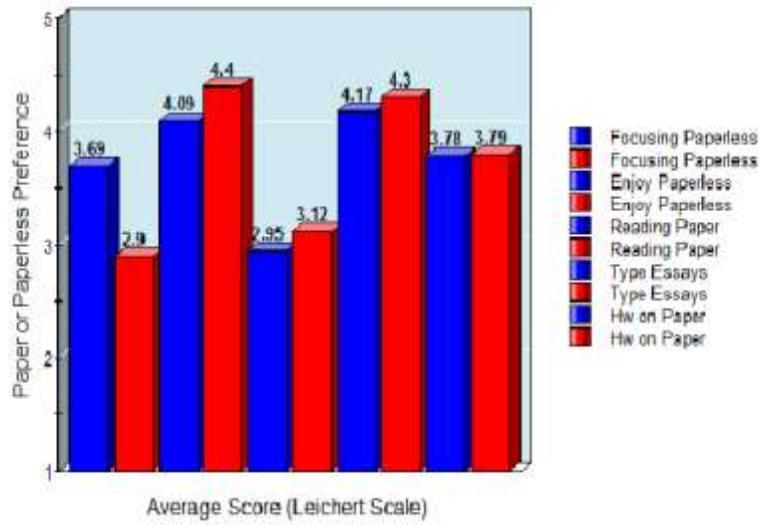
Summary

The quantitative data did not show statistical significance (the p value used was .05) from the pre-survey to the post-survey for paper vocabulary homework; the pre-test showed students wanting paper vocabulary at an average score of 3.78 as opposed to 3.79 in the post-survey. Although the scores were similar, the pre-survey had mostly neutral answers, however in post-survey most of the scored responses had polarized; either strongly agree or strongly disagree answers. The researcher theorized that this resulted from students having not enough time to adjust to vocabulary homework on paper, so some students came to feel very strongly against it.

Most of the data was statistically insignificant from the pre-survey to the post-surveys, likely because of the short duration of the study. The four week study gave students little time to change their opinions or reflect on how doing vocabulary on paper had changed their experience. If given more time students may have changed their minds.

The response that was statistically significant was "do you think you focus well in the paperless classroom" which decreased from 3.69 to 2.9. One possible reason this number changed significantly was students had been immersed in the paperless classroom for months until they had paper vocabulary. Students may not have had an accurate comparison of focusing between paperless and paper prior to having paper vocabulary, which helped them to remember how focusing on paper compared to paperlessly may change.

Interviews

Several days after the post-survey students were interviewed. The researcher selected 4 students through random number generator (students used the numbers they were assigned at the beginning of the study.) During the interview students were asked which activities they preferred to do on paper (homework, journals, readings, tests) and if any of those had changed after having

vocabulary on paper. I used these random numbers assigned at the beginning of the study to identify students instead of aliases.

Engagement. All four interviewed students answered they preferred to have the paperless classroom and they all claimed they had originally asked that vocabulary was done on paper. Student 6 said that the paperless classroom was more fun because, "it was more interesting than having it on paper. It's different than all the other classes, which make us do everything on paper, and makes me more excited."

Similar to student 6, student 8 said that they liked the paperless classroom because, "Computers keep my attention, because I can follow along with my mouse. I don't like paper for too long. Also, scrolling makes me feel like the page isn't too long."

Student 17 also exclaimed that the paperless classroom was, "more fun than doing things on paper, because the paperless classroom allowed [students] to play games and do activities that they couldn't do on paper." Although student 15 also enjoyed the paperless classroom the student had a mixed review of the paperless classroom.

Student 15 said, "I like doing things on the computer better, because I like technology and I use it a lot at home, but I don't pay attention [on computers] because I can just play with the scroll bar." All students interviewed said they enjoyed the paperless classroom seeming to enjoy the fact that it was something unique about English class, since they did not have the opportunity to use technology in the other classes.

However, three of the four students interviewed said that the believed that they focused better on paper, which is similar to the quantitative results as well. Despite students enjoying the paperless classroom more, students suggest they believe they do not focus as well, which would also contribute to student engagement in the classroom.

Intrinsic Motivation. When asked how much technology should be used in the classroom all students interviewed suggested that they wanted a choice between paper and paperless classroom. Students interviews suggested that they were more willing to complete homework and other assignments if they had the ability to choose how they did it.

Student 8 expressed that they preferred to do reading and writing on the computer because it, "held my attention instead of daydreaming; it's more manageable to think of just a small scrollbar," however they also liked "choosing paper or paperless keeps things exciting."

One interesting change was that while student 6 previously said that the paperless classroom was more fun, however later said, "I think I focus better when it's on paper for homework...because then I have something I can hold to remind me to do it."

While student 15 expressed great interest in the paperless classroom for keeping their interest they also said, "I like having the option of doing the homework on paper because my dad picks me up and then takes me back to his work. By the time we get home it's too late to log onto a computer. Having a paper copy means I can do the homework anywhere I go, but having the computer copy means that if I lose it I still have a chance to do it."

Student 17 said that "having only a paper copy was stressful because it meant that if I lost it then I couldn't do my homework anymore. But I wouldn't want to just have it on the computer, either, because if there are problems with the technology working then you can't do your homework, either. Both is the best way." Having choices was extremely important to all students interviewed, because they all thought that they would be more motivated to do homework if they had multiple ways to do it. Students asked in the post-survey overwhelmingly agreed with 52% strongly agreeing and 30% agreeing that they wanted a choice as shown in Figure 2 below.

Figure Two — People Who Prefer Choice of Paperless
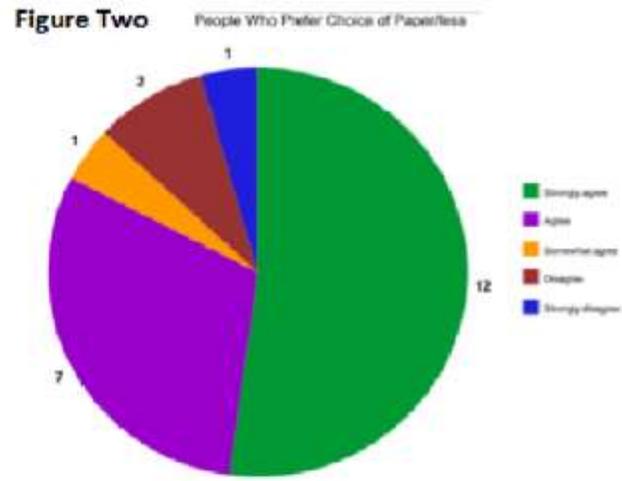
Conclusion

This research project sought to determine if the paperless classroom had an effect on student engagement by comparing students' responses in pre and post surveys. Although there are many technological advances there are still questions to what extent technology should be used in the classroom. By asking students how they feel it impacts their engagement researchers can begin to get an idea of how students want technology to be used in the classroom.

Although most data was statistically insignificant in the pre and post surveys, one explanation is after having paper vocabulary for a full month, students had strong feelings about the paperless homework because they realized they thought they enjoyed it or did not after that time. The only statistically significant change before and after putting the vocabulary homework on paper was students' view on how well they focus in the paperless classroom, which decreased likely because students had a point of comparison from the paperless classroom.

Limitations

One limitation of this study was the time constraint. Due to weather and other factors this study was only 4 weeks long, so in order to ensure more legitimate results researchers would want to have more time in the paperless classroom. With such limited time students did not have time for their opinions to fully change over time. This likely contributed to why there was no statistically significant change in most results.

Another limitation was the small sample size of only 23 students, which was not an accurate representation of a population. With larger sample sizes and more time the study would be able to more accurately represent students' opinions. In the post-survey most students either strongly agreed or strongly disagreed with paper vocabulary which had a larger effect in corrupting the data, since each student's vote held more weight.

In addition to more time and larger sample sizes, the population was students who were digital natives; they were familiar with technology both at home and in school. By the time the study had started the students had already been using the paperless classroom for several months. In order to replicate the study with more valid results the study should be longer and begin when the students start using the google classroom to ensure all changes in opinion happen during, and because of, the study.

Recommendations for Future Research

The researcher recommends that this study is replicated with a longer time frame so that way students have time to change their opinions and so those changes could be measured. Since the study was only had paper vocabulary for four weeks students opinions did not have statistically significant differences. Timing the study to begin when students first begin using the paperless classroom may also have a significant impact on students' reactions to the paperless classroom. In order to more accurately measure students' opinions on the paperless classrooms students should be recorded starting at the beginning.

Additionally the researcher recommends larger sample sizes for the students. Since there were only 23 students participating in the survey the students may not be representative of the population. Therefore, to get a more accurate sample a researcher would want to have students more students, all of whom had never experienced the paperless classroom before so that they would not have bias.

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APPENDIX B

INFORMED CONSENT RELEASE

<u>**Investigator:**</u>
My name is Ms. Stuebner and I am a graduate student at University of Mary Washington. I am inviting
your child to participate in a research study. Involvement in the study is voluntary, so they may choose
to participate or not.

I am interested in learning more about the effect of technology in the classroom, specifically the paperless classroom. You will be asked to answer questions which they will rate on a scale from 1 (strongly agree) to 5 (strongly disagree). Some students will additionally be asked to answer interview questions This will take approximately twenty minutes and will be done during normal classroom time. All information will be kept confidential. I will assign a number to their responses, and only I will have the key to indicate which number belongs to which participant. In any articles I write or any presentations that I make, I will use a made-up name for the students, and I will not reveal details or I will change details about where you work, where you live, any personal information about you, and so forth.

The benefit of this research is that you will be helping us to understand the paperless classroom. This information should help us to get a better understanding of student engagement in the paperless classroom. The students will be participating in the same activities, however they will be asked how they feel about the paperless classroom. The potential risk is students could feel uncomfortable sharing their experiences. Risks will be minimized by allowing them to stop the study at any time). If they do not wish to continue, they have the right to withdraw from the study, without penalty, at any time.

 Participant - All of my questions and concerns about this study have been addressed. I choose, voluntarily, to participate in this research project. I certify that I am at least 18 years of age [or have a signed parental consent form on file with the_____ department].

My child can participate in interviews since answers will only be shared under a pseudonym.
yes [ ]   no [ ]

_____
__
_____
print name of participant

 _____
_____
_____   _____
signature of participant   date

_____
__
_____
print name of investigator

_____
_____
signature of investigator   date
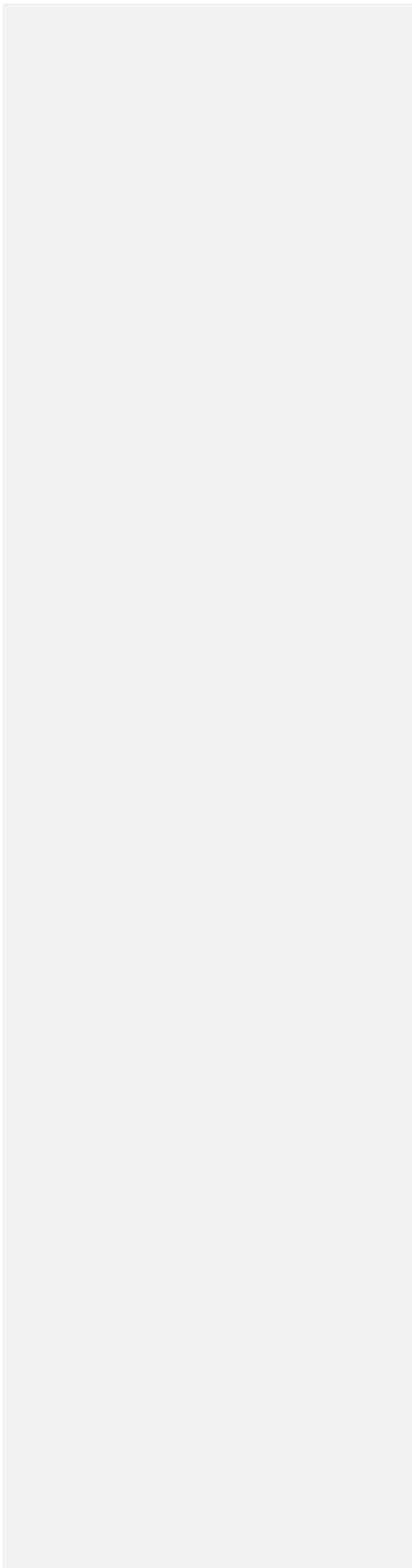
APPENDIX C

ASSENT FORM

Paperless Classroom Study

 My name is Ms. Stuebner and I am a graduate student at the University of Mary Washington and very excited to be your student teacher! I am asking you to take part in this research study because I am trying to learn more about how the paperless classroom affects your engagement in the classroom. I want to learn about the ways students prefer to use technology.

If you agree, you will be asked to complete a survey. You will be asked to select certain tasks you prefer to do with technology and others you prefer to do on paper. I am interested in determining students' feelings about how we use technology. Answering these questions will take about 20 minutes. You do not have to put your name on the survey.

A select set of students will be randomly selected to be interviewed for 5-10 minutes and their responses will be recorded in the form of written notes.

You do not have to be in this study. No one will be mad at you if you decide not to do this study. Even if you start, you can stop later if you want. You may ask questions about the study.

If you decide to be in the study I will not tell anyone else what you say or do in the study. Even if your parents or teachers ask, I will not tell them about what you say or do in the study unless I learn about something that might mean you are in danger.

Signing here means that you have read this form, or have had it read to you, and that you are willing to be in this study.

print participant's name _____

signature of participant _____

signature of investigator _____

date _____

Apendix D

Paperless Classroom Pre-Survey

* Required

What is your number? *

Have you ever had a paperless classroom before? *

○   **yes**

- ○ **no**
- ○ **not sure**

Did you enjoy your previous experience with the paperless classroom? *
Choose whichever option fits best.
- ○ **N/a (I have never had a paperless classroom before this year**
- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

How often do you use the paperless classroom at home? *
Choose whichever options fits best; you can mark more than one.
- ○ **Only in class**
- ○ **When I'm absent**
- ○ **Once or twice a week at home**
- ○ **Two-three times a week at home**
- ○ **Four-five times a week at home**
- ○ **Almost every day**

I enjoy learning in a paperless classroom. *
Choose whichever option fits best.
- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

I think I focus better in a paperless classroom. *
Choose whichever option fits best.
- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

I like to do some activities on the computer better than using paper. *
Choose whichever option fits best.
- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

I prefer to do readings on paper, rather than online. *
Choose whichever option fits best.
- ○ **Strongly agree**

    ○   **Agree**
    ○   **Somewhat agree**
    ○   **Disagree**
    ○   **Strongly disagree**

I prefer to type my essays and journals online instead of writing them on paper. *
Choose whichever option fits best.
    ○   **Strongly agree**
    ○   **Agree**
    ○   **Somewhat agree**
    ○   **Disagree**
    ○   **Strongly disagree**

Having a paperless classroom helps me remember to do assignments. *
Choose whichever option fits best.
    ○   **Strongly agree**
    ○   **Agree**
    ○   **Somewhat agree**
    ○   **Disagree**
    ○   **Strongly disagree**

Trying to figure out the Google classroom can be confusing. *
Choose whichever option fits best.
    ○   **Strongly agree**
    ○   **Agree**
    ○   **Somewhat agree**
    ○   **Disagree**
    ○   **Strongly disagree**

Apendix E

Paperless Classroom Post-Survey

* Required

    What is your number? *

    I enjoy learning in a paperless classroom. *
    Choose whichever option fits best.
    ○   **Strongly agree**
    ○   **Agree**
    ○   **Somewhat agree**
    ○   **Disagree**
    ○   **Strongly disagree**

I think I focus better in a paperless classroom. *
Choose whichever option fits best.

- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

I like to do some activities on the computer better than using paper. *
Choose whichever option fits best.

- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

I prefer to do readings on paper, rather than online. *
Choose whichever option fits best.

- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

I prefer to type my essays and journals online instead of writing them on paper. *
Choose whichever option fits best.

- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

Having a paperless classroom helps me remember to do assignments. *
Choose whichever option fits best.

- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**
- ○ **Strongly disagree**

Trying to figure out the Google classroom can be confusing. *
Choose whichever option fits best.

- ○ **Strongly agree**
- ○ **Agree**
- ○ **Somewhat agree**
- ○ **Disagree**

      ○   **Strongly disagree**

I would prefer to have a choice between paperless and paper. *

Choose whichever option fits best.

      ○   **Strongly agree**

      ○   **Agree**

      ○   **Somewhat agree**

      ○   **Disagree**

      ○   **Strongly disagree**

Do you think there's anything else I should know about your paperless classroom experience or any other comments about this study you would like to leave for me?

Apendix F

Interview Questions

What do you think about the paperless classroom?

Are there parts you like doing on computers better than on paper? Why?

Are there parts you prefer to do on paper? Why?

Does the paperless classroom help you stay focused or do you find it confusing? Explain.

Would you want to do the paperless classroom in other subjects? Which one

Do you have any other thoughts about changing homework to paper, this study, or the paperless classroom?