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Increasing Technology Engagement in the Mass Customized Secondary Classroom

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Abstract

The increase in student-centered and self-directed classroom practices and curriculum delivery methods such as proficiency based education (PBE) and mass customized learning (MCL) coupled with 1:1 technology environments requires the student be productive without direct teacher oversight. Using productivity software, this research project examines student digital engagement in a high school classroom employing student-centered MCL and PBE practices in an attempt to answer the following research questions: "Can the use of self-monitoring productivity applications increase positive technology outcomes while decreasing negative technology outcomes?" and "Do student perceptions of their engagement fit their behavior?" This qualitative study uses three phases of survey to collect data concerning productivity as reported by the productivity application and students' beliefs concerning how the percentage reflects their actual computer use.

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Introduction

Recent educational mandates and trends have moved many districts and states to adopt systems that reject the Carnegie unit as a measurement of academic success. The Carnegie unit, which requires seat time, is being replaced by educational systems that award credit when students demonstrate proficiencies in Proficiency Based Education (PBE) or competencies in Competency Based Education (CBE). Only when students have demonstrated designated abilities within these systems are they awarded credit and able to move on to the next academic unit. Rather than time being the constant and learning being flexible, these systems insist the opposite: learning is the constant while time is considered flexible. These shifts in educational philosophy necessitate a redefinition of the roles of teachers and students (Reigeluth, 1997; Sokolov, 2001; Schwahn & McGarvey, 2012). As students will no longer be in lockstep with their peers, teachers need to facilitate academic opportunities for groups of students rather than being the holder of knowledge, while students need to be empowered and self-directed learners rather than the receptacles of knowledge dispersed from the front of the class (Schwahn & McGarvey, 2012). Mass Customized Learning (MCL), whose supporters cite that current educational methods and systems were built in previous ages and do not leverage today's technologies to serve students (Sokolov, 2001; Schwahn & McGarvey, 2012), has been constructed to accomplish the goals of PBE. Pointing to services offered by Apple and Starbucks and technologies used by Amazon and Google, proponents of MCL argue that while customized services are seemingly ubiquitous, they have not become a staple of educational practice (Schwahn & McGarvey, 2012). The expectation is that technological tools like those used by the companies listed will lead to personalized learning, greater student engagement, students who are self-directed and allow the educational needs of all students to be met rather

than serving only the students who are academically and cognitively ready for the teacher's scheduled lesson on any given day (Reigeluth, 1997; Schwahn & McGarvey, 2012; Sokolov, 2001; Watson, Watson & Reigeluth, 2015). Missing from this discussion however is the effectiveness of technology in self-directed education. Many studies (Awwad, Ayesh & Awwad, 2013; Fried, 2008; Gurung & Rutledge, 2014; Junco, 2012a; Junco, 2012b; Mao, 2014; Ragan, Jennings, Massey & Doolittle, 2014; Ravizza, Hambrick & Fenn, 2014) cite among the drawbacks of technology use lower academic performance; off-task behavior; distractions caused by non-academic use, peer use, and multi-tasking; and the diminishment of student engagement. Since PBE and MCL are not only mandates for many educators at the state and district level but also present the moral imperative of providing education for all students, school and classroom structures need to be identified in order to fully leverage technology for student engagement so the benefits of PBE and MCL can be fully realized for each student.

Literature Review

Proficiency Based Education and Mass Customized Learning

Maine is one of many states that implemented state educational reforms as a result of No Child Left Behind legislation (Silvernail et al., 2013). Maine Legislative Document 1422, signed into law May 21st, 2012, requires "high school diplomas [be] based on standards established by rule". In order to accomplish a vision that Maine schools offer "academic instruction, assessment, grading and reporting . . . based on students demonstrating mastery of the knowledge and skills they are expected to learn before they progress to the next lesson, get promoted to the next grade level or receive a diploma" (Maine Department of Education, n.d., para. 1) many

Maine schools chose to adopt MCL as their instructional approach to realize the implementation of a Proficiency Based Education system.

The goals of Mass Customized Learning are aligned with Proficiency-Based education as both require that students demonstrate attainment of standards (content knowledge and skills) before moving to the next academic unit, allow students to take various paths to demonstrate proficiency on standards and require that students are self-directed (Johnston, 2011; Maine Department of Education, n.d.; Schwahn & McGarvey, 2012; Sokolov, 2001). Integral to the MCL vision is the use of technology to expand the reach of the student, teacher and classroom; to offer customized time frames; to differentiate curriculum; and to aid in the self-direction of learners. While this learner-centered focus affords students greater freedom, Ausburn (2002) found freedom and control were listed by younger students as both the greatest positive and negative aspect of self-directed learning units. While studying both younger students (defined in the study as students taking coursework for high school credit) and older students at the Tulsa Technology Center, Ausburn (2002) found that younger students felt "confused, isolated, overwhelmed, and 'left behind'" (p. 232) by self-directed learning units while at the same time citing among the positives academic choice, personal control, a relaxing learning environment free from pressure and fear, as well as a flexible time frames. Older students also cited these as positives, but did not feel the frustration and problems staying self-motivated that younger students associated with customized learning (Ausburn, 2002). Figure 1 below, created by Ifenthaler and Schweinbenz (2013), shows that technology is believed to be a change agent that can change a teacher-centered classroom into a student-centered classroom through the use of high-level technology use. This high-level technology use however, has not yet come to fruition as Ifenthaler and Schweinbenz (2013) found that while teachers found Tablet-PCs (TPC) had a

positive impact on student motivation educators were "not quite clear how TPC can be used as an innovative tool to facilitate learning and instruction" (p. 532). If the vision of MCL is to be realized, technology will need to be leveraged to create student-centered classrooms that engage students and assist them in being self-directed.

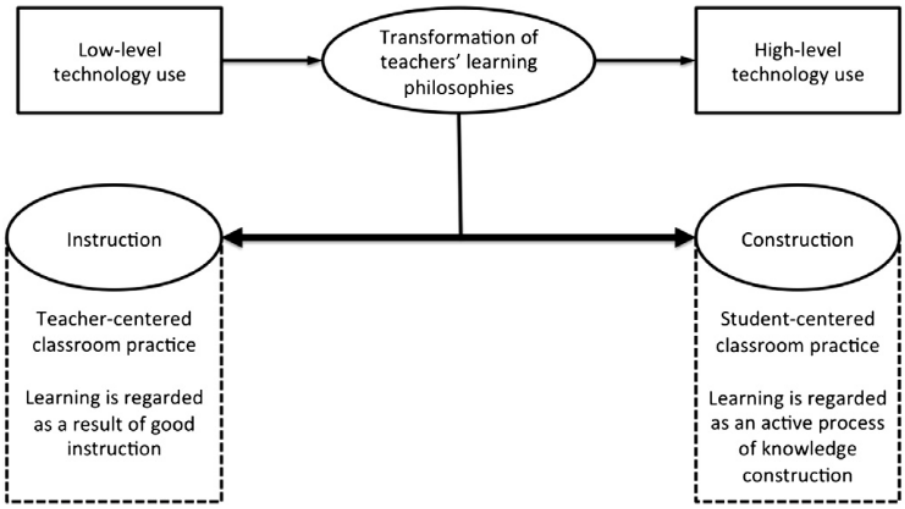

Fig. 1: From Iftenthaler & Schweinbenz, 2013, based on the conceptual work of Hooper & Reiber, 1995

Use of Technology in Education to Reach Digital Natives

A considerable number of studies demonstrate that laptops and other personal devices (tablets and cellphones) constitute sources of distraction in the academic environment. Fried (2008) found through student survey that "the use of laptops was negatively related to several measures of learning" (p. 911) after studying one hundred thirty-seven college students in a General Psychology class conducted primarily through lecture. Similar results were found by Ragan et al. (2014), who through observation and student survey found that students who brought laptops to a class composed of lectures tended to be off-task "almost two-thirds of the time" (p. 84). These results are echoed by Awwad et al. (2013) who conducted their study on a

campus that had adopted a policy of "promoting the use of laptops in lectures in order to target the development [*sic*] more interactive type of classes and to enhance lecture delivery" (pp. 154-155). Awwad et al. (2013) found "the majority of students were not using laptops in class for class-related material" (p. 159). Instead students used laptops to engage in non-academic behaviors. This behavior is of special concern as Ravizza et al. (2014) reported the more students used the internet for non-academic purposes in the classroom the lower their test scores, demonstrating the academic cost of unregulated technology use.

Though many students, and society at large, believe in the ability to multi-task, Junco (2012a) found that non-academic high-frequency texting and moderate-frequency use of Facebook resulted in poor performance on exams in lecture-based classes. While emailing and searching, the other moderate-frequency technology uses, had negligible effects on G.P.A., it is clear that non-academic use of technology was found to have negative effects on academic performance. This is of particular concern for high school environments where students are younger, have not generally secured admission due to previous academic achievement and as found by Gurung and Rutledge (2014) are susceptible to blurring personal digital engagement (PDE) with educational digital engagement (EDE). Mao's (2014) study of one hundred sixty-six high school students found that students believe they are more creative and learn better when they use social media, that they can get help and find inspiration using social media and that social media is fun since it offers interaction and is centered around a participatory culture that "provides the power, freedom, flexibility, and immediacy that they cannot obtain from structured classroom learning environments" (p. 219). Despite the stated advantages of social media, these same students also discussed concerns that it can be distracting. Fried's (2008) study found that not only did a student's use of technology distract the user, it also distracted others as "Other

students' computer use*"* was chief among items reported when asked which aspects of class interfered with their learning (p. 911).

It is the distractions technology provides that need to be minimized if students and teachers are going to be able to maximize the benefits found by Lee, Brescia and Kissinger (2009) who, using data from the Educational Longitudinal Study, were able to control for socioeconomic status, home computer access, parental involvement and academic expectation, and found that one hour of computer use for school work and work other than school work improved not only scores in reading and math, but also teacher evaluations in both academic disciplines. In addition, Cuevas, Russell and Irving (2012) in a study of Independent Silent Reading (ISR) found the types of results those invested in MCL are looking for when they discuss leveraging technology. Cuevas, et al. (2012) Compared a control group that did not participate in ISR with a group that participated in textbook-based ISR and a third group that participated in technology-supported ISR. The researchers found that the students in the technology-supported ISR group "showed the strongest performance on all of the internal reading assessments that gauged how well students comprehended the weekly reading passages" (p. 459). This is attributed to the computer reading package's ability to offer a variety of cognitive tools to assist students in comprehension. Additionally, the technology-assisted ISR group "showed a significant and pronounced increase in reading motivation when compared to the control group" (p. 460). It is these types of outcomes that can be expected from positive technology uses if classrooms can improve upon the results reported by Kay and Lauricella (2014), who found that in the classroom laptops were involved in 30% more beneficial activities than they were sources of distraction.

Student Technology Engagement

Though the blurring of PDE and EDE that Gurung and Rutledge (2014) found provides a significant issue for educators as students do so "often without perceiving any boundaries between the personal and educational digital engagement" (p. 99), setting rules in place will not likely solve the perceived academic problems with such behavior since engagement rather than compliance is the goal. Engagement continues to be defined in a myriad of ways. According to Harris (2011) Some models "draw on behavioural, academic, psychological, and cognitive dimensions of engagement" and use attendance, compliance with rules, classroom participation and participation in extracurriculars as metrics (p. 377). Since both believing that students have developed enough technological ability through personal use and seeing little purpose in valuing students' personal use of technology both do harm, Gurung and Rutledge (2014) recommended that educators avoid being too enthusiastic or pessimistic in their views of technology integration. Instead they stated that teachers should design education that uses technology using "pedagogical models that foster meaningful learning engagement for students" (Gurung & Rutledge, 2014, p. 99) rather than assign tasks using technology.

Not being too optimistic or pessimistic and instead realistic may prove difficult since it requires that many adults need to embrace new technologies that are not well understood by teachers, administrators and the community at large. However, half steps (steps that do not fully embrace or fully eschew) may be more detrimental when working with students. As found by Mao (2014) "social media uses in classes by teachers are close-minded, acquired approaches, which may not fit the natural affordance of social media and those formal learning environments" (p. 220). Additionally, Mao (2014) found that students expect teachers to use social media in ways that make use of the natural benefits of social media, but instead social

media is often banned or used in a trivial way. A lack of pro social media policies have left students "not sure whether they are encouraged to use social media in classes and the adoption of social media stays in individual classes only" (p. 219). This may in part be due to the divide between the attitudes of digital immigrants and digital natives. Digital immigrants (those born prior to 1980) and digital natives (those born after 1980) may well be artificial distinctions as noted by Salajan, Schönwetter, and Cleghorn (2010), but there are distinct differences when it comes to technology use as digital natives are "more adept with and confident about using digital technologies than the digital immigrants" (p. 1400). Furthermore, Margaryan, Littlejohn and Vojt (2011) found that digital natives made greater use of tools than digital immigrants in three key areas: formal learning, informal learning and socializing.

This technological divide constitutes a larger problem when one considers that as comfortable as natives (students) are with technology, immigrants (educators and policymakers) are often not. Beyond the distractions that teachers fear technology will cause for students, teachers are also hesitant to use technology in the classroom because of a belief that students will access inappropriate websites and not make good use of their time (Scott & Meeussen, 2017). A lack of understanding how to best manage devices in the classroom becomes clear when looking at the findings of a study conducted by Ottenbreit-Leftwich et al. (2012). After surveying teachers and teacher educators concerning technology used in education careers and the technology curriculum offered in teacher educator programs respectively, Ottenbreit-Leftwich et al. (2012) found the only area that teacher education programs offered more curriculum than necessary was in technology for professional development. Three other areas: technology for communication, technology to analyze student data and technology to support higher-order thinking skills were found to be underserved when looking at teacher education programs

through the lens of teachers' reported needs (Ottenbreit-Leftwich et al., 2012). There is little surprise then that Mao (2014) found that students believe "teachers are not using the tools correctly and they need to manage the process better and interact with students more" (p. 219).

Though as Salajan et al., (2010) stated, dividing teachers and students into digital immigrant and digital native distinctions may "be more damaging then [*sic*] helpful in fostering a constructive learning environment conducive to a mutually beneficial student-teacher rapport" (p. 1402) it is necessary to understand the characteristics of the modern learner in order to plan for and meet their needs. Ng's (2012) work found that chief among the characteristics of digital natives is a willingness to learn a new technology at the same time they design and create the content that would be incorporated within the technology. Ng (2012) also found that "Less than 10% of those studied indicated that they explored the technologies first" (p. 1073) and despite this "the majority of the students did not encounter technical issues" (p. 1074).

While teachers in student-centered MCL constructs "must change from being a 'sage on the stage' to being a 'guide on the side--a coach, a mentor" (Reigeluth, 1997) and "should be made to feel comfortable when a student acquires knowledge that the teacher does not possess" (Sokolov, 2001, p. 204) students must receive not only environmental challenge but environmental support in order to be adequately engaged (Shernoff et al., 2016). Without adequate understanding of and skill in the digital environments that digital natives exist in, it is difficult for educators to plan for and provide the challenges and supports needed by students. Additionally, Ng (2012) found that while students make abundant use of digital tools

> unless taught explicitly to use other (educational) technologies, it is unlikely that digital natives would think about educational technologies or consider tinkering around creating

> a website or wiki unless for a purpose, for example to advertise for a product or for a graded academic assignment. (p. 1077)

This echoes Margaryan et al. (2011) when they found that "students have a limited understanding of how technology may support learning" (p. 438). Though a cause is not given in the mixed methods study it was also found that "there is little evidence in our study that lecturers have a clear understanding of ways in which technology could support effective learning" (p. 438).

While students may be more technologically able than ever, their technological growth is being stunted by a lack of educator training, educator buy-in, clear and supportive school policies and curriculum that makes authentic use of technology which in turn affects their engagement as shown by the research of Rashid and Ashgar (2016) who presented a path analysis of the interplay between Technology Use, Student Engagement, Self-Directed Learning and Academic Performance. This path analysis shows direct and positive effects of technology on student engagement and self-directed learning, but not on academic performance. Academic performance is shown to be directly negatively affected by technology use. However, the study does conclude that technology has an indirect and positive result on academic performance by way of self-directed learning. Rashid and Ashgar (2016) found that despite technological abilities digital natives possess, careful and well-designed pedagogy was necessary to diminish negative outcomes.

Demands on well-designed pedagogy go beyond design for positive technology integration. As school districts move away from whole class instruction as a primary way to deliver content to students in favor of models where students receive direct instruction targeted towards their needs in small groups, such as Response to Intervention Models and the Workshop

model, it is important that the rest of the class stay academically engaged as they work on a variety of assigned tasks (Taylor & Nesheim, 2001; Dorn & Saffos, 2005). In schools that have made a commitment to technology, worries persist concerning how students will make use of technology when they are not directly monitored (Scott & Meeussen, 2017). It is important in these situations that students are able to regulate their own behaviors and stay not only on-task but academically engaged rather than occupied in the types of behaviors, such as wasting time and visiting inappropriate sites, that cause educators to question if they should be using technology within the classroom (Scott & Meeussen, 2017). A study of eleven high schools across five school districts implementing proficiency-based pathways by Lewis et. al. (2013) found that though "the interventions differed across sites and schools but had in common the use of online technology to allow students to progress toward mastery" (p. 1) demonstrating that access to technology seen as an integral part of proficiency based education.

Gaps in Research

The studies discussed above were largely conducted on college campuses, studying college students who by virtue of acceptance to and appearance in an undergraduate program have had success in a secondary school. The studies were conducted largely by surveying students concerning their own behavior and often do not temper those findings with observation or a mixed-methods approach. Those studies that have done so have found inconsistencies when comparing interview data with survey data. In one instance students discussed social media and then incorrectly identified technologies that were distinctly not considered social media tools. Many of the academic environments studied were comprised of lectures and were not student-centered. These environments only ask students to replace one tool for another (pen and paper is

replaced by screen and keyboard) and the functionality of the tool is largely left neglected, leading to the lack of authentic integration voiced by the participants studied by Mao (2014). As such, these academic environments did not demonstrate that they are student-centered since the lecturer held the knowledge and distributed it to the students and it is not student-directed since the professor unilaterally defined the learning path. This arrangement of teacher and students not only exacerbated the digital divide, but the cultural divide as well.

Furthermore the studies, except for one, were bereft of communication concerning technology integration expectations or policies. On study stated that the students were not asked to bring laptops while "Unregulated use of laptops" appears in the title of another. The gaps in research demonstrate a clear need for additional studies in the area.

There have also been gaps in determining the efficacy of technology use within self-directed classrooms. Such studies need to be determined by comparing classes that employ the same practices. A non-iPad classroom was observed to have a greater frequency of verbal and behavioral engagement in research conducted by Perry and Steck (2015) looking at the effect iPads had on engagement in a 21st-century geometry classroom. As discussed by the researchers the non-iPad instructor used direct instruction and offered largely teacher-centered activities while the iPad instructor used student collaboration and exploration as the primary modes of content delivery (Perry & Steck, 2015). Without controlling for types of instruction it is difficult to ascertain the effect that technology had on student engagement.

As a hallmark of MCL, technological solutions must be found that maximize student engagement and raise academic achievement. Currently, studies conducted under a variety of circumstances show that for all of technology's benefits, technology is a large cause of distractions for students leading to a lack of engagement and positive outcomes. These studies

however do not indicate what role better integrated and more authentic uses of technology and student-centered and student-directed class structures could play in these results. Many of the studies point to the need for more studies to be done within academic settings where technology was used to facilitate learning. Clearly, Cuevas et al. (2012) found that purposeful use of technology led to increased academic ability and engagement just as Lee et al. (2009) found that one hour each day resulted in higher math and reading scores. Since greater periods of use had diminishing returns one can surmise that focused tasks using technology pay the largest dividends which speaks to the need for fleshed out curricular expectations. With a demonstrated lack of curricular focus in teacher education on using technology within the classroom, this study will attempt to find if the technology itself can be leveraged to increase student engagement by clarifying PDE and ADE for students and making them aware of and having them reflect on their off-task behavior. Though the work of shifting educational paradigms from traditional to CBE, PBE and MCL can be difficult for all stakeholders the results can include "a positive change in both teacher and student engagement as well as perceived increased in rigor due to student-centered learning" (Increased Academic Rigor section, para. 2) as Sullivan and Downey (2015) found when they studied an alternative program's shift from a traditional system to a Competency Based Approach. To help assure similar positive results during an ongoing paradigm shift this study will work to answer the following: Can the use of self-monitoring productivity applications increase positive technology outcomes while decreasing negative technology outcomes? Do student perceptions of their engagement fit their behavior?

Research Design

Purpose of Research

The purpose of this research is to investigate whether technology itself can provide a solution for one of the greatest problems that technology use within the classroom poses: the distractions that the devices themselves offer both to the user and those near the user. The blurring of Educational Digital Engagement and Personal Digital Engagement by digital natives during a time when classrooms are offering more time for students to work in class is diminishing the effectiveness and power of technology within the academic setting. This study will add to the growing body of research concerning technology use within the classroom by studying student digital engagement in a secondary classroom engaging in student-centered MCL practices. To this point research concerning technology's role in engagement has largely been done within the college setting and has generally occurred in classrooms where lecture has been the primary instructional method.

This study will benefit students and educators in environments that make use of student-centered educational models and where students have 1:1 access to laptop or tablet devices. Additionally, this study will directly benefit its students participants by providing them with an objective view of the nature of their digital engagement in their academic setting.

Research Question

The primary question this research aims to answer concerns whether or not the use of self-monitoring productivity applications increase positive technology outcomes while decreasing negative technology outcomes. A secondary line of inquiry is whether or not student perceptions of their engagement fit their behavior. Long term, a reduction of technology's

efficacy may result in anti-technology policies and practices being established in schools. Anti-technology policies and practices would not only negate the significant expenditures school systems have made in providing such technologies to students, but also disrupt the work many schools are invested in as they implement Mass Customized Learning (MCL) practices and Proficiency Based Education (PBE) systems. Previous research studies have identified the positive academic outcomes technology can offer. Others have shown the negative effect technology has had on engagement and therefore academic success. However, studies have not worked to research how technology may work to solve the engagement issues it has been found to pose.

Core Concepts

This research makes use of concepts concerning engagement introduced by Gurung and Rutledge (2014) who coined the term Personal Digital Engagement (PDE) to describe uses such as texting, use of Facebook and consumption of media. Gurung and Rutledge (2014) also coined Educational Digital Engagement (EDE) which defines student use of technology for learning activities. These terms and their definitions are the result of coalescing the research and findings of previous studies. Both the concepts of PDE and EDE will be used in this study, however for ease of communication with students “on-task behavior” and “off-task behavior” will be used. As an operational definition in the classroom “on-task” will be used to mean “engaging in work directly associated with the course” while “off-task” will be used to describe all other behaviors. Though being on-task is not an indication of full or true engagement, it does set initial and rudimentary parameters for academic engagement. Additionally, the above definition does not require that a student is engaged in a single prescribed task, but rather allows that students are engaged in any task directly associated with the course. This terminology also fits with language

that students have heard in during their time within our school and will be a better match with the terms that RescueTime makes use of: “productive” and “distracted”.

Approach

Quantitative surveys conducted at regular intervals will be the primary tool used in this study. While qualitative studies cited within the Literature Review have conducted surveys to research the effects on technology within classrooms, they have quantified how many students were distracted by certain behaviors they have engaged in or had a classmate engage in. Other studies used qualitative methods such as the phenomenological study conducted by Gurung and Rutledge (2014) have demonstrated that a blurring between types of Technology Engagement exists. Studies, have not, however attempted to quantify students’ coherence between their distracted technology behavior and an accurate awareness of their behavior. It has also not been studied what effect students having accurate and objective information regarding their technology use might have on their behavior. Most of the data in this study will be generated by having participants record and react at regular intervals via survey to information concerning their on-task and off-task behavior by RescueTime Lite. Additional data will be generated through a pre and post survey. Demographic information will be used to help contextualize data. Additionally, the post survey will also include an optional question that will allow students to add comments concerning the use of RescueTime and identify if they would be willing to be interviewed for follow up should data need greater context or clarification.

Since students will be reporting their off-task behavior to their teacher, one possible weakness of this study is a lack of trust between student and teacher. Students may be less likely to accurately record the information presented to them through RescueTime if they believe they believe repercussions or a change in policies will follow. This study is being conducted in the

spring semester of the school year after classroom rapport and trust between teacher and students has been established.

A perceptual issue that surrounds the use of RescueTime concerns privacy. As chromebook laptops are owned by the school and provided to students by the school, students have less privacy concerning their use of the devices than many students, parents and community members believe they have. Through the use of remote software, teachers are able to monitor what websites students are visiting on their chromebooks when students are in the school building. Following these boundaries, RescueTime will be set only to record student behavior during the school day. Students will also be shown how to pause the application so that it will not track their behavior during school hours if they use their laptops, but are not in attendance.

Method(s) of Inquiry

As this research project is being undertaken to address a growing issue seen within the classroom of the researcher and is an outgrowth of said researcher reflecting on his own practice, an action research design is being employed (Creswell, 2015). In keeping with an action research design, this research aims "to solve an immediate, applied problem" (Creswell, 2015, p. 588). A strength of the design is its focus on the teacher researcher's own setting, however this strength causes some to dismiss it as informal and employing less rigorous methods (Creswell, 2015). The data collected will benefit the researcher's classroom either by finding a solution or by reducing the number of possible solutions to the problem of students whose access to and use of technology during class would be categorized as PDE. Other studies have focused on how long students spend in PDE as opposed to EDE; they have found the types of apps and activities students have been engaged in, but they have not worked to study a solution because they have

not been conducted by the teachers themselves, but outside observers working to observe a phenomenon rather than find a solution to a "practical problem" (Creswell, 2015, p. 591).

Methodology

Setting

Data will be collected at Oak Hill High School, a school in transition to a MCL delivery model to enact Maine's vision for PBE and Diploma. Access to the site is through the researcher's employment and through the approval of the RSU #4 superintendent.

As a school working towards PBE through the implementation of MCL, students spend more time working independently or in small groups in a student-centered approach than in a more traditional teacher-centered one. Additionally, each student at Oak Hill High School has been provided with an ACER Chromebook Model 738T for academic use both in school and out. This 1:1 computing environment coupled with greater access to time spent in the classroom without direct teacher instruction makes the site an appropriate one to study student academic engagement and the role technology plays in it when students are expected to work independently while the teacher works one on one and/or with small groups of students.

Sampling/Participants

The participants in this study will be drawn from the author's two Junior English III classes and two Senior English IV classes. All students in those courses have access to 1:1 laptops as required for the study and will be given the opportunity to participate. Students under 18 will need parent consent in order to participate in the study. All participating students will give consent prior to participation.

Description of methodology

The quantitative study will be conducted in three phases: Introduction and Overview, Practice and Reflection. In the Introduction and Overview phase, participants will be given an initial questionnaire asking them to estimate what percentage of their computer use during class is on-task (Educationally Engaged) and off-task (Personally Engaged). Students will also be asked if they believe they should become more on-task and whether or not they believe they can do so. Afterwards subjects will install RescueTime application on their computers, be given an overview of how it works and shown how to calibrate the application. The application may be configured differently for different classes. Due to the nature of RescueTime, a business productivity application, the application can be set to run "24 x 7" or for certain hours during different days of the week. It cannot, however, be set to run for different times on different days or to a precise schedule, which creates some difficulty since the Oak Hill schedule, comprised of block scheduling, causes classes to meet every other day and other initiatives such as Advisory, Raider Connection (our support period) and Late Starts for Faculty work, cause periods to run at different times each day and for different lengths. For this reason at least two configurations will be implemented. One configuration will have the application run during the entirety of the school day. Another configuration will have the application run during the outermost limits of the class schedule. Both configurations will run for the five days (Monday through Friday) that generally make up the school week.

In the Practice phase, students will complete exit slips stating the amount of time reported by RescueTime that was spent in product work and reflecting on the accuracy of the Productivity report from RescueTime. Participants will be asked using a likert scale whether or not the percentage of time reported as Productive by Rescue Time feels low, on target, or high.

In the Reflection phase, students will be surveyed using a likert scale to respond to a series of questions to determine whether or not students believe the application and its reports affected their academic behavior in the classroom, in class technology behavior, if they found themselves trying to perform better than their previous report, how likely they are to continue using the RescueTime application or an application like it, if during the period of the study they were more or less distracted by the computer use of their peers, and if they found their cell phone use during class increase during the period of the study. The questionnaire will also include an optional question that will allow students to add comments concerning the use of RescueTime and identify if they would be willing to be interviewed for follow up should data need greater context or clarification.

Operational measures

For this study three separate questionnaires (one for each of the study's three phases) will be used to collect data from participants. The questionnaire in the second phase will be used repeatedly. The questionnaires will be created by the Principal Investigator. The questionnaires discussed will collect quantitative data through the use of likert scales and numeric data as participants will self-report their productive time as reported by RescueTime and their beliefs as to how accurately RescueTime is reporting their productivity. Qualitative data may be collected as part of and in response to the final survey should data need greater context or clarification.

Data collection

The three questionnaires will be the primary instruments by which data will be collected in the study. Each survey will be administered by paper and data coded by student will be entered into a computer-based version of Microsoft Excel, which exists on a computer in my residence of which I am the primary user. The first questionnaire will be employed following

the period set out to collect participant consent forms. The purpose of the first questionnaire is to capture student attitudes toward and beliefs concerning their personal Technology Engagement during school. The second questionnaire will be given repeatedly to capture student data concerning their Personal Digital Engagement. The third and final questionnaire will ask students to reflect on how being a part of the process outlined as the second phase has affected their behavior and if they found the application useful and intend to use one like it in the future. It will also ask about other types of digital engagement during school. This final questionnaire will also include an optional question that will allow students to add comments concerning the use of RescueTime and identify whether or not they would be willing to be interviewed for follow up should data need greater context or clarification. Demographic and academic information (such as course schedules) will also be used to help give context and clarity to the information.

Data analysis

For the purposes of this study, participants will be asked questions about their "on-task" time versus their "off-task" time. These terms will correspond to RescueTime's use of "productive" and "distracted" as descriptors for a participant's time spent using their computer. Both "on-task" and "productive" will be used to determine a participant's Educational Digital Engagement (EDE), while "off-task" and "distracted" will be used to determine a participant's Personal Digital Engagement (PDE).

Collected participant data will be analyzed for trends in behavior to see the effect that using the application has on their digital engagement.

Expected findings

It is expected that participants underestimate the percentage of class time spent "distracted" or spent in Personal Digital Engagement. When students begin to use RescueTime it is expected that their overall percentage of time spent engaging in Educational Digital Engagement will increase while their overall percentage of time spent engaging in Personal Digital Engagement will decrease. It is expected that participants that indicate that they believe they should and can increase their on-task behavior will see higher increases than those that respond in the negative.

Potential issues and weaknesses

Personal Digital Engagement in the secondary classroom is only defined in this study as school computer use on 1:1 ACER Chromebook devices within the classroom. It does not take into consideration cell-phone use, which represents a significant classroom distraction. Though a question on the final survey asks students if they found themselves using their cellphone more or less during the study, there is a significant lack of data concerning this type of technology engagement. Additionally, Chromebooks, which make use of Google's Chrome OS run nearly every app through the Chrome Browser. Running a similar study on a more traditionally featured computers or laptops (that runs applications both within and outside of a browser) may yield different results. Students will be responsible for categorizing the websites and applications they make use of. They will receive guidance on how to do so, but websites like YouTube offer both Academic and Personal uses to students while in class, which may skew some of the data.

Lastly, RescueTime does not know how a website is actually being used. The application only reports that the website was being accessed and the amount of time spent accessing it. RescueTime uses this information to create an overall Productivity Percentage for a given period

of time after factoring in the productivity designation of the website itself (if it has been changed specifically for that site) or the category the website belongs to (if it has not), but it does not know if the use was actually productive.

Research Narrative

Inciting Incident

Technology use in the classroom became a concern of the researcher after it was repeatedly observed that while students in the classroom were being given more independent time to work, but that the time was not resulting in greater student work completion and progress. PBE and MCL initiatives were coming to the school district, were being brought to the classroom, but students were not apparently benefiting from the increased time to write, read or research using their laptops.

As a believer in the transformative ability of technology and the great social, economic and educational equalizer that providing 1:1 computing can bring to students in rural settings in Maine, turning away from technology did not appear to be an appropriate answer. The researcher has often served on technology committees, attended Maine Learning Technology Initiative conferences and been a part of several RSU #4 technology pilots. He has often been drawn into conversations defending technology and its use in classrooms and recalls one particular conversation with a former administrator who after an apparently difficult morning dealing with laptop issues expressed that the school ought to get rid of them all. During the early years of the site's MLTI Initiative, the primary way of dealing with laptop issues was to either remove the laptop from the student or to render it almost useless by turning off much of its functionality. Access to the internet was almost always turned off for students who had come into conflict with our appropriate use policy. Recent administrations have taken approaches more consistent with

an defining the laptop as a device that facilitates and aids student learning. It is extremely rare to hear that a laptop has been taken from a student and will not be returned or that a student has no access to the internet. Some students do experience restricted access as a result of inappropriate use, but it no longer appears to be the default punishment and students have a larger degree of individualized restrictions rather than having their access to the internet disabled.

Configuration & Phase 1

After receiving approval from the University of Maine's IRB, RSU#4 Superintendent, informing the Oak Hill principal of the study the study was ready to commence. The timeline, however was shortened due to the impact of a variety of weather events that had the additive effect of moving the start date of the second semester by an entire week. Alongside the usual snow days in their many varieties (late arrival, early release and no school entirely) RSU #4 also experienced an entire week out of school at the end of October due to severe and lasting power outages to the towns RSU#4 serves due to the bomb cyclone (Trotter, 2017). To complicate matters further, our return from the December Holiday break found us walking into a school without "enough [water] volume in the current well to support the operation of a full day" (Regional School Unit No. 4 Board of Directors, 2018. p. 1) This issue had large implications on our daily schedule for weeks and our building for months. For the first two weeks, we were only able to hold classes until lunch, which caused us to see classes either greatly reduced and at times canceled. For months we dealt with the closure of some of the bathroom facilities and in order to hold school we provided students with bottled water.

These incidents not only caused the school district to move back the semester end date, but also pushed had profound effects on the delivery of curriculum. These issues impacted both when the study began as well as the the curriculum offered during the study and, at times, the

manner in which the curriculum was offered. The study was originally conceived to last over 10 weeks with Phase 2 lasting eight. Due to scheduling issues, the study occurred over eight weeks, with Phase 2 lasting only six.

At the beginning of the spring semester, students were introduced and invited to the study with an introduction to the RescueTime application, a discussion of what their role in the study would entail if they agreed to participate along with a distribution of consent letters to those who demonstrated interest. During this introduction phase students were told and it was reiterated to each group at least once that they would not receive different treatment concerning their computer use because they were part of the study and submitting self-reported evaluations of their laptop use. A student reporting a low productivity score would still only be redirected when it was obvious to the instructor that she was off-task just as she had been in the prior semester. Student interest in the study was higher than expected. Twenty-seven out of the 58 students eligible for the study initially signed up. Ultimately, two students were unable to participate due to lack of parent consent forms and two others were unable to continue with the study when their schedules changed.

After students returned the appropriate consent documents, a student letter and a parent letter for those under 18 and only a student letter for those 18 and over, the RescueTime application was downloaded and installed from the Chrome Web Store and configured and the Phase 1 survey was conducted. The free version of RescueTime, branded RescueTime Lite, was configured to monitor students during the hours of 7 a.m. to 2 p.m. Monday through Friday. Configuration steps also included managing the categories of website activity. RescueTime divides websites into the following categories: Business, Communication & Scheduling, Social Networking, Design & Composition, Entertainment, News & Opinion, Reference & Learning,

Software Development, Shopping, and Utilities. Upon initial setup users are asked to categorize them their three most productive activities as well as their three most distracting activities. Students had the ability to configure this individually and students were instructed to configure RescueTime according to the reasonable expectations of a school setting. This meant that most productive activities could be Business, Communication & Scheduling, Design & Composition, Reference & Learning and Software Development while most distracting activities could be Social Networking, Entertainment, and Shopping. Students gave rationales for their decisions and selected productivity designations accordingly. News & Opinion was a category in the researcher's initial assessment of categories that could be list as productive. It is reasonable that students involved in a U.S. History course (as Juniors) or a Government course (as Seniors) would access News & Opinion websites in the course of their course work. Some students, such as Jay (pseudonyms are used for participants), identified their own behavior and chose to set categories that could be designated as Productive as Distracting instead. When Jay was asked reminded that News & Opinion could be a Productive category he replied "not the way I use it."

As part of the initial setup students were also shown how to pause the RescueTime application. While recording during a student's absence was not believed to affect the study to any statistically relevant degree, (since abnormalities, such as chronic absences would be discussed), showing students how to suspend the application gave them the ability to disable monitoring while not in the school building. As school devices there is a level of possible oversight concerning their use, however teachers do not have this ability. Teachers are able to use Hapara Teacher Dashboard to see what tabs students have open and the screen they are currently viewing, but this ability is only available while students are in the building. Showing students how to pause RescueTime allowed this monitoring ability to remain consistent.

Complications during Phase 1 setup largely consisted of issues surrounding Emma, who has restrictions on her laptop use per parent request. Emma is restricted from accessing the wider web and is only able to visit websites specified by teachers. In order for Emma to visit websites the sites have to be sent to our tech department who then whitelist them for her account. It was communicated by the tech department that these restrictions were put in place because Emma had not been engaged in use at home deemed appropriate by her parents. While students have filtered access to the web when connected to the school's Wifi, many do not have such restrictions at home, however our tech department is able to place restrictions on student devices and accounts that students experience both in the building and outside of it when such actions are deemed necessary. Due to Emma's restrictions, it took some additional steps to install the RescueTime application and for her account to access associated web addresses.

Phase 2

Due to a configuration issue, data capture did not occur for many participants for the first few days. RescueTime has a setting "I'm already using the full RescueTime application on this computer." When selected, the understanding is that the full version of RescueTime is installed and the web application does not collect data. The first week of the study was designed to check in with students and their configurations. Students were asked to access their productivity score each class, to demonstrate that they knew how to pause and unpause the application and to check to make sure their overall configuration was correct. During this time students found and changed individual website designations as necessary to fit their general use of those sites.

Phase 2 began in earnest the following week after it was demonstrated that configuration was correct and students understood the application and lasted six weeks. As the schedule

allowed surveys in Phase 2 were administered on the first class meeting for the week (either Monday or Tuesday) and asked students to reflect on the prior week.

During this phase the instructor circulated as students were completing the surveys to monitor whether or not students were accessing the productivity score for the correct week. During the first few weeks students were explicitly encouraged to look through the list of websites and to make sure they were being appropriately categorized. After the first two weeks the explicit instruction to check the list of websites and their categorization stopped, however, whenever a student expressed surprise concerning their productivity score time was spent looking at the websites recorded for that week and whether or not they were categorized on the productivity scale correctly. Modifications were made to these settings as appropriate. Juliet, who is enrolled in Jobs for Maine Graduates (JMG), had visited sites concerning future planning (finding a job, an apartment and a car) that registered as very distracting. After correcting the settings for these sites Juliet revised her survey as the productivity score had changed. In all phases the researcher walked away from participants as they completed the likert scales appearing on the surveys.

Complications during Phase 2 included instructor and student absences and one student forgetting to unpause their RescueTime applications. On occasion Instructor absences pushed back data collection for the week to the next class meeting, while student absences pushed back data collection until the student returned back to school. As the study included the month of February and Daisy's family took an extended vacation, Daisy's data are the result of five weeks of collection rather than six. She was the only student in the study who missed an entire week due to vacation. Two students, Edmund and Holden, started the study late due to absences

combined with calibration issues and another, Eliza, missed one week after she did not restart her application after an absence.

Phase 3 & Reflection

The Phase 3 survey was administered at the end of six weeks. The researcher made himself available and circulated to ensure that the parts of RescueTime that needed to be accessed would be referred to appropriately by participants. The survey was primarily concerned with student experience during the study and also asked students if they would be willing to be interviewed if any of the data required follow up. Six of the 20 respondents that replied in the affirmative were interviewed.

During Phase 3 it was reported that Pip, who had not mentioned previous restrictions, had not been able to access YouTube during the course of the study. While much of YouTube was accessible to students at the beginning of the study, students report that it was more restricted by the end. Though these restrictions are not limited to music, they had a large effect on how students were able to access music. The cause of this change is unknown. The technology department reports that any changes in setting on their part were made prior to the school year. The changes may have been on the part of YouTube itself or our filter OpenDNS. Pip, however, reported that he had no access to YouTube throughout the duration of the study. Pip, is a student who is largely tied to his computer; his productivity scores call into question his calibration and will be discussed further.

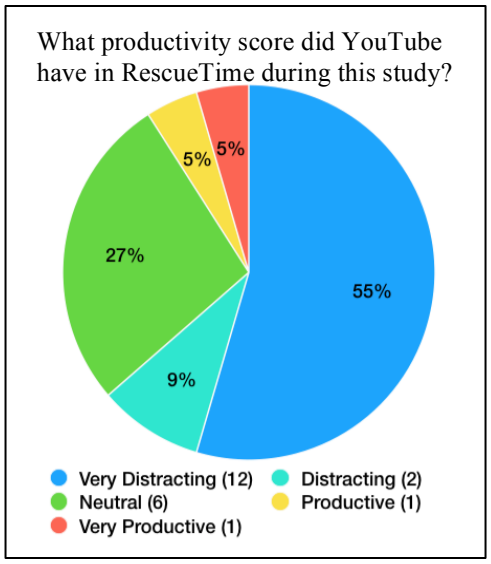

Figure 1

YouTube, was largely used by students to listen to music during work sessions. While this use does create

some distraction for students, as they are repeatedly choosing their next song, students have YouTube operating in the background rather than the foreground of their laptop activity. When YouTube became less accessible to students, it was observed that students made greater use of apps like Spotify and their cellphones to listen to music instead. Student use of YouTube ranged from listening to music for enjoyment, using it as a tool to minimize outside peer distractions while writing to watching educational videos. These uses led YouTube to be classified from Very Distracting to Very Productive by students.

Common Curriculum Experiences During the Study

Since the monitoring by RescueTime occurred during entirety of the school day much of the curriculum students experienced is unknown, however all of the participants in the study were members of either the researcher's 11th or 12th grade English classes. Not students were members of both classes. Due to the schedule issues mentioned prior, the curriculum was weeks behind where it should have been. During the study students grade 11 students completed essays concerning common themes seen in work by American authors concerning war and then moved to a unit where students made an assessment about the values seen through works (both short stories and Twilight Zone episodes) from the 1940's to the 1960's. Grade 12 students largely focused on a variety of activities concerning *Hamlet*, but also worked on tasks associated with poetry and blogging. In both classes activities concerning use of laptops occurred during nearly all class meetings. Students in both classes make use of their laptops for a variety of activities surrounding reading, writing, and viewing.

Laptop Monitoring During Study

Students laptop use is monitored in a general sense. Though Hapara Teacher Dashboard allows educators in RSU#4 to monitor which tabs students have open on their chromebooks as

well as which screen is currently being viewed, it is rare that the researcher makes extended use of this application. To use this application to monitor student devices educators must devote much of their attention to it and refresh it often in order to see what browser activity students are currently involved in. Instead, the researcher prefers to circulate around the room as a resource to students as students are involved in work tasks.

During the study Hapara Teacher Dashboard launched the "Scheduled Browsing Sessions" feature which allows educators to force students to view desired websites for a determined period of time. This feature was not used during the duration of the study as it would have negated much of the study's focus.

Teacher Absences

Beyond pushing back the date of data collection, researcher absences also caused students to have "work days", periods where they are largely on their laptops, often unchecked. Though some educators at the research site eschew the practice, the researcher like other colleagues often assign "work days" when they are absent. Due to the nature of instruction and pacing at times in MCL students often require study hall-like periods during class time to play catch up, to revise past work and to meet with the teacher. These periods are often planned within the regularly scheduled curriculum for either part or all of the period. They seem to occur most when a unit is ending and giving way to another unit beginning, but are not only utilized then. Though work days are not always appropriate choices for sub plans, they are often requested by students and have come to be expected during teacher absences. Two out of three of the researcher's colleagues affirmed that work periods are their default sub plans as well when asked "Do you find that our current practice has us designating "work periods" for class when you wouldn't have before?" and "Also have they become part of your (strategic) plan for

dealing with your own absences? / student absences?" Both N. Camire and T. Luchini offered terse responses to the initial query "yes and yes" and "1. YES! 2. They are my default sub plans." respectively prior to offering greater depth (personal communications, April 2, 2018 & April 3, 2018 respectively).

When work periods are assigned as sub plans students often need to make use of digital resources such as teacher websites and digital handouts and are expected to work independently on their next step, which is often very different than that of their neighbor and others sitting within the classroom. Substitutes do not have access to Hapara Teacher Dashboard and have been observed not to have the agency to intervene in off-task student laptop behaviors.

Summary

This 3 phase study was conducted over an eight week period, using the RescueTime productivity application. Prior to the time frame, significant issues occurred causing many disruptions and changes to the school's daily schedule and calendar. The concern that these issues may persist caused changes in the study design as well as to the curriculum students would have been studying had complications not occured. Students within the study were redirected no more often than those outside of it. Student and teacher absences occurred during the study. All of this combines to make this action research study reflective of realistic educational practice.

Data Analysis / Interpretation of Findings

The research questions for this study are "Can the use of self-monitoring productivity applications increase positive technology outcomes while decreasing negative technology outcomes?" and "Do student perceptions of their engagement fit their behavior?" Prior work

demonstrated that today's students are blurring Educational Digital Engagement and Personal Digital Engagement (Gurung & Rutledge, 2014) and that technology has an indirect and positive result on academic performance by way of self-directed learning (Rashid & Ashgar, 2016). In a school setting with 1:1 Chromebook computers and educators working to implement student-centered and self-directed learning practices to fulfill goals of MCL and PBE, this three phase research project commenced.

For ease of entry and access to data, Google Sheets attached to the researcher's school Google Account was used rather than Microsoft Excel. The researcher's primary computer is an ACER Chromebook similar to the models students use. In order to keep surveys and student data secure, it was determined that data entry needed to occur at school rather than at the researcher's home.

Phase 1 student predictions concerning the percentage of time they believed were spent in off-task laptop activities were found to be on average 22 percentage points different that the actual time spent engaged in distracted, non-productive activity when compared to the first data reported by RescueTime in Phase 2 when using absolute values to calculate the average. Absolute values were used to determine this as it is not whether students predicted a percentage that was higher or lower than actuality, but rather how different their prediction was from their actual behavior. Figure 2 graphs the predictions

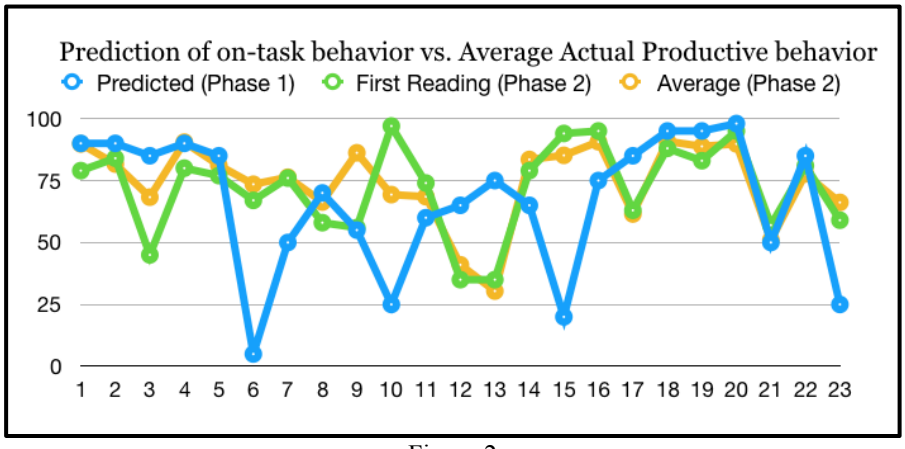

Figure 2

made in Phase 1 (shown in blue) alongside the first self-reported productivity scores in Phase 2 (shown in green). Figure 2 appears to indicate that incorrect assumptions concerning time spent on-task are large and pervasive. When absolute values were not used to calculate the difference, it was found that students estimate that they are on-task 7 percentage points more than they actually are. Although these results are derived from participants largely taking an educated guess at the amount of time they are spending off-task, it is of interest that while 13 participants (57% of participant pool) answered "Yes" to the question "Did you find yourself trying to perform better on future RescueTime reports?" on the Phase 3 survey the average difference between students' average time spent productive was on average only 1.9 percentage points higher than their first productivity score. Additionally, 10 of the 21 students had an average that was worse than their initial productivity score shown in Figure 3. Of the thirteen participants that answered "Yes," indicating that they tried to improve their productivity scores, six of those participants had averages that were lower than their initial productivity score demonstrating that they were unsuccessful in improving their scores even though they reported they attempted to. Figure 2 also shows how similar most participants' first productivity scores (shown in green) are to their overall average (shown in orange). These results point to a disconnect between perceived laptop use and actual laptop use

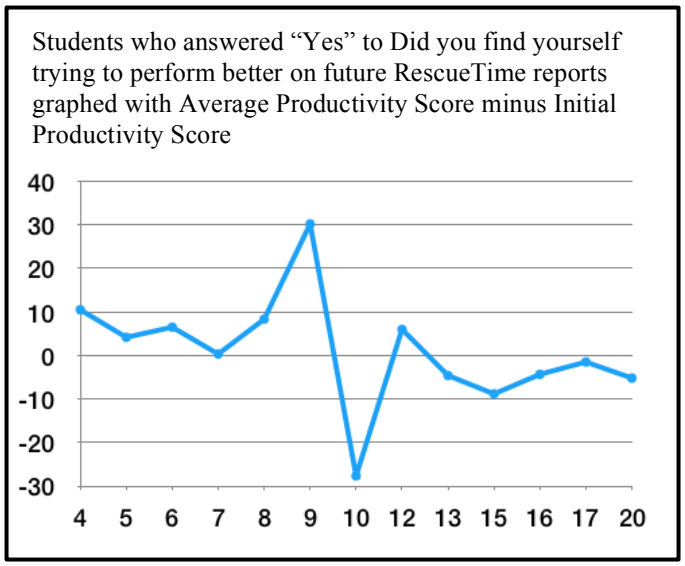

Figure 3

similar to the disconnect documented by Gurung and Rutledge (2014) when discussing the blurring of Educational Digital Engagement and Personal Digital Engagement.

These results would appear to come into direct conflict with participant responses to the Phase 3 survey question ¨To what extent do you believe RescueTime and its reports changed your in-school use of your laptop during this study?¨ The question does not specify positive or negative change, but rather change. In order to perform better on each successive week students would need to change their behavior in response to the data reported previously. Participant responses were ¨Not At All¨, ¨To Little Extent¨ and ¨To Some Extent¨. even though the data suggests that there is no correlation between their perception of the effect RescueTime may have had on their performance and their actual performance. No participants answered ¨Unknown¨ or ¨To Great Extent¨. Participant data was graphed in Figure 4 in the attempt to uncover if there was any demonstrable correlation between student perceptions of the effectiveness of the RescueTime application on student behavior and actual changes in laptop use as shown in the difference between student Phase 2 averages and their initial Phase 2 score. This effort did not yield any noticeable correlation. This further suggests that students' perception of their laptop use and their actual use bear little resemblance, though a larger data sample may lead to more conclusive results. Based on these data points alone, this

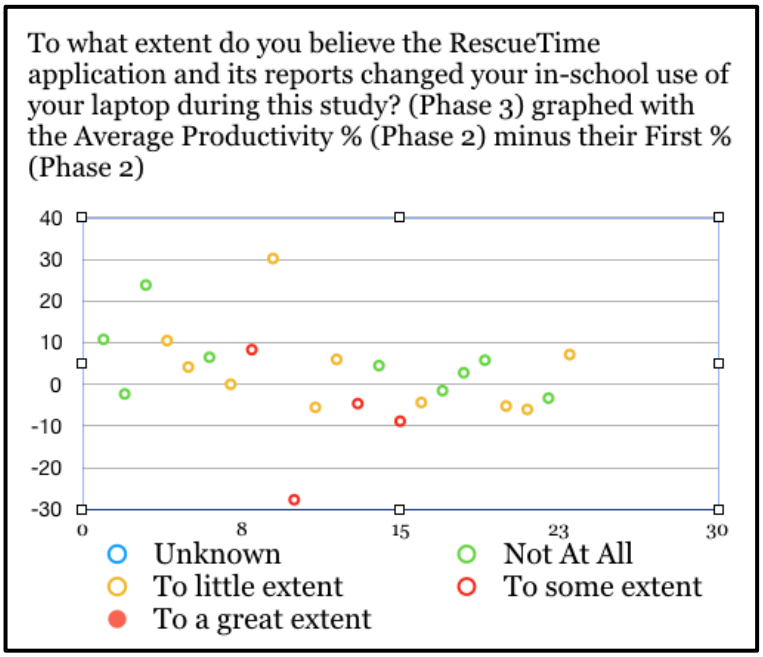

Figure 4

study was not able to demonstrate that self-monitoring applications are able to increase positive technology outcomes while decreasing negative digital outcomes to any statistically relevant degree. Additionally based on the data discussed above, student perceptions of their own engagement does not fit their actual behavior as student predictions and reflections on their on-task behavior, at large, demonstrates no coherence.

This finding does call into question the veracity of many of the data points as reported by RescueTime as seventy-eight percent of responses (103 of 132) over the course of the study to the question"How well do you believe RescueTime has accurately captured your laptop use?" indicated that RescueTime had accurately captured a participant's laptop use seen in Figure 5. Pip, as mentioned previously, is a student who is largely tied to his computer and based upon both work completion and researcher observations does not regularly engage in classroom tasks either analog or digital. Pip is computer savvy and has expressed interests in becoming a videogame or graphic designer. He is very technology literate and one of only three students with a productivity score above ninety percent. As this study was built around the use of a productivity score as reported by RescueTime and asked for students to self-report, Pip who complied with these requests, was not asked to leave the study and his data points were not removed. The data of other participants in the study more closely match researcher observation of student laptop use. Unfortunately, Pip did not desire to be interviewed for follow up.

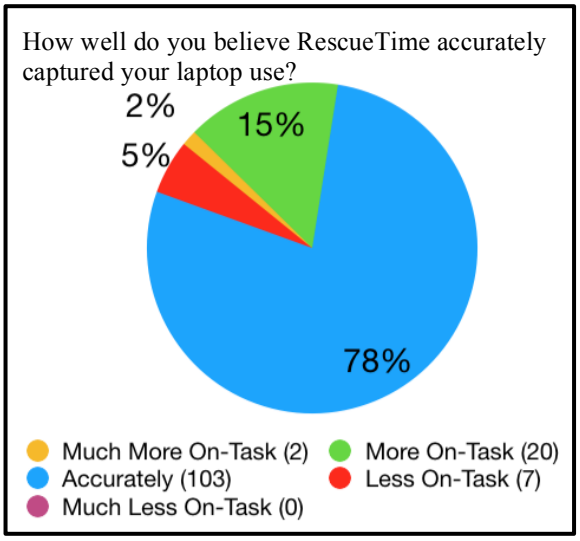

Figure 5

Six students (26% of participants), however, were interviewed in the attempt to give more context to the data. As described to students when starting the interviews, the researcher uses his laptop in very different ways than students use theirs. Given this gap the first question asked concerned the perceived advantages of being on-task during class time. Student responses included ¨getting better grades in high school so I can go to a better college" (Huck), ¨a lot more free time out of school" (Juliet), "less stress" (Holden), and "my parents are happy" (Charlotte). Not only do these answers echo sentiments consistent with the benefits understood by the researcher himself over years of working with students, but they also echo the data when the average time spent productive for each participant is graphed against the student's corresponding grade point average (g.p.a.). Though there are a few outliers, Pip for instance) the trend line clearly demonstrates that students who make greater on-task use of their laptops during class have higher g.p.a.s. While there is an apparent correlation here, causation is not demonstrated.

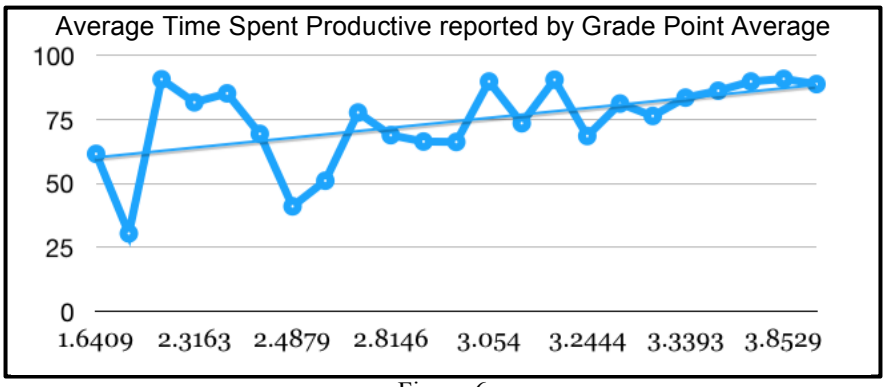

Figure 6

Though this study is unable to demonstrate that productivity software can increase positive technology outcomes while decreasing negative technology outcomes in any substantial way, over half of the participants in the study indicated that they were at least "Likely" to continue using the RescueTime application after the conclusion of the study. When those interviewed were posed with a question concerning whether or not they would pay for a version

of a RescueTime-like application that would allow them to set goals, send reports to students and even alert them if they were spending too much time off-task, students answered with a variety of affirmative responses validating that such an application was worthy of purchase. Within their responses underlying attitudes concerning the nature of responsibility for on-task behavior can be found. Charlotte sees value in the application and feels like it would be worth a teacher paying for it for his students. Charlotte's sentiment shows an understanding that there is value in the application, but that the responsibility for attaining the application would lie with the high school teacher and not for individual students using the application. Students in RSU#4 do not pay for any curriculum related expenses unless books are lost or damaged or an skipped an Advanced Placement test they were scheduled to take. The only fees they experience as an expectation deal with extracurricular and sports, however when coupled with responses from Huck and Etta, Charlotte's response takes on a different tone. Huck does not see RescueTime or a similar application being useful in high school, but does see its utility in a college setting where "you have more free reign and stuff" while Etta also thinks the app would be helpful in a college setting because "it would be like the person 'get on-task'". It may be inferred from these responses that "the person" Etta is referring to is a high school instructor. Within each of the responses above an underlying belief exists that teachers play are responsible for a student's on-task behavior. This understanding of a teacher's role may have diminished not only the responsibility of the student to keep herself on-task, but also the belief that she should.

By introducing a quantitative method of data collection as well as the use of a productivity application as a tool for measuring off-task and on-task laptop behavior, and further documenting a disconnect between perceived student on-task laptop use and actual on-task use this research adds to the work of Gurung and Rutledge (2014) . This research has also

demonstrated that at least some students feel that the locus of control for their on-task behavior exists outside their responsibility, and instead within the responsibility of a third party, most likely their high school instructor. Due to the time constraints and scope of this research project this line of inquiry could not be given greater attention.

Discussion

Conclusions

As a teacher researcher, it was difficult to design a data collection tool without thinking about the implications such a tool would have for the classroom. By making use of the RescueTime application with 21 participants over six weeks, this research project is built upon nearly 692 hours of data collection. However, the first two phases of surveys were designed to minimize classroom impact. Due to this, it is difficult to ascertain whether or not students spent enough time with Phase 1 and 2 surveys to truly reflect on their behaviors and whether or not that reflection had an impact on their future behavior.

The current default structure of class time within the researcher's classroom consists generally of a small whole class activity or instruction, a check for understanding and then class time for students to make use of to accomplish current or past assigned work. During this time the teacher circulates to work with individual students or small groups to check on student progress, clear up misunderstandings, reteach, and to provide extensions as needed. It was often difficult to cut final this time short for the administration of surveys. Even though the surveys only consisted of three or two questions (in Phases 1 and 2 respectively) prioritizing that time for an activity that did not primarily benefit students, but the researcher instead, proved difficult as student questions and needs were forced to wait. After some time however, survey

administration fell into an expected rhythm and the time required for their completion the surveys decreased.

The findings suggest student perceptions of their on-task laptop behavior is inconsistent with their actual behavior. Students are generally unaware of how much time they spend on-task vs. off-task demonstrated by an inability to accurately predict their behavior. Additionally, students who indicated that they made attempts to improve their on-task behavior did not.

The findings of this study also suggest that the use of a productivity tool alone does not cause students to become more on-task and less off-task despite indications that students find the feedback the tool offers helpful and a majority believed they were reacting to it positively.

A positive correlation between time spent on-task in school and a student's grade point average is suggested by the findings.

Finally, the findings suggest that high school students demonstrate attitudes consistent with eschewing responsibility for staying on-task. Instead students shift responsibility for their on-task behavior to a third person, presumably a teacher, even though they identify a variety of personal short-term and long-term benefits for staying on-task.

Recommendations

Future studies in this area should be implemented in an advisor / advisee relationship. By existing outside the traditional teacher / student dynamic, greater time can be spent discussing and auditing student performances to encourage reflection. This would minimize and perhaps even remove the conflict within the researcher that exists when holding class time as sacred, but needing to use that time for the collection of meaningful data.

To aid in this process a data collection tool should be designed specifically to provide school and student feedback. The productivity software offered a range of features that are

incompatible with the realities of school. Originally the research was to be conducted by dividing the students into two groups. One group would have RescueTime configured to record only the time spent in the classroom with the researcher while the other group would be configured to record the entire school week. This became problematic due to our every other day block scheduling and our start times. The RescueTime application, built for the world of work, allows users to set the application to start and end recording on the hour and to record only on certain days of the week. These options are too finite to fit a school schedule that sees classes meeting every other day (Monday, Wednesday, Friday one week and Tuesday, Thursday the next) with period start times that do not occur on the hour and that change throughout the week. To accomodate advisory on Monday and Thursday, Raider Connection (a universal study hall period) on Tuesday and Friday and a district wide teacher professional time each Wednesday through an hour delayed start, the bell schedule has three different configurations within the school week. The water issues our school experienced negated any possible attempts to divide the participant pool into two groups. While we were back to full days prior to the beginning of the study, the fear that the ongoing water situation may cause further disruptions led to using the full school

Oak Hill High School Bell Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
Warning Bell	7:30	7:30	8:30	7:30	7:30
Period 1	7:35 - 8:55	7:35 - 8:52	8:35 - 9:50	7:35 - 8:55	7:35 - 8:52
	Advisory 9:00 - 9:20	Raider Connection 8:57-9:27		Advisory 9:00 - 9:20	Raider Connection 8:57-9:27
Period 2	9:25 - 10:45	9:32 - 10:50	9:55 - 11:10	9:25 - 10:45	9:32 - 10:50
Period 3	10:50 - 12:35	10:55 - 12:35	11:15 - 12:40	10:50 - 12:35	10:55 - 12:35
Lunch A	11:20 - 11:45	11:20 - 11:45	11:15 - 11:36	11:20 - 11:45	11:20 - 11:45
Lunch B	11:45 - 12:10	11:45 - 12:10	11:36 - 11:58	11:45 - 12:10	11:45 - 12:10
Lunch C	12:10 - 12:35	12:10 - 12:35	11:58- 12:20	12:10 - 12:35	12:10 - 12:35
(Wednesday)			12:20-12:40		
Period 4	12:40 - 2:00	12:40 - 2:00	12:45 - 2:00	12:40 - 2:00	12:40 - 2:00

day configuration. A tool that allows greater control for these configurations would allow for various types of participant groupings and may offer greater accuracy.

Additionally, a tool built for use in schools with students and for a purpose such as this one may allow the instructor or researcher to set and lock the settings concerning the designation of categories along the productive or distracting continuum along with labeling specific websites with those designations. If calibration changes for websites are allowed in a future study it may be helpful if the application flagged and reported changes made by students and required students to give a reason for the change. As some websites such as YouTube may often be viewed as distracting until a student is given an assignment where YouTube becomes a valid school resource it would also be appropriate to have the ability to change a website's designation easily and for a given period of time only to have it return automatically to its default state later.

Implications

In the attempt to close the gap between perception and reality as it concerns on-task student laptop use, schools and their teachers should explicitly define and model on-task digital behavior. At its best this process will require professionals to think honestly about their own use and what on-task use may look like. The highly distracting nature of devices hooked to the internet needs to be considered with an eye not to what kids should be doing, but rather what does it look like to be a practicing professional? Adults often decide to ban devices or device practices for students which they themselves make use of professionally and appropriately. In the end, students need to be able to regulate their own on-task behavior not only because their instructor has assigned them work to do, but because their well-regulated attention will cause them to be more successful both in the world of education but also employment.

With this in mind, school systems will need to start this process when devices are placed in their hands. In RSU#4 1:1 iPads are used from kindergarten to second grade and 1:1 chromebooks from third to twelfth. Appropriate use must go beyond how to treat the device, but how and when the device is to be properly used. This process needs to focus on gradually turning over responsibility for student on-task behavior from the teacher to the student. This may mean making use of certain technologies to limit off-task behavior until students have demonstrated the ability to self-regulate. Though age and maturity should be considered to create such a structure some students may require scaffolding to a greater or lesser degree. The creation of a system of grade-appropriate redirection strategies and disciplinary actions that reflect the expectation that students are to become more responsible for their own on-task regulation as they age would need to be a formal process that includes all stakeholders. Due to the perceived gaps between digital natives and digital immigrants and the damaging consequences of these publicly declared distinctions (Salajan et al., 2010) while it would be helpful to bring students into the fold when discussing and creating these systems, it would be beneficial to frame new practices as best for all of those in the community of learners (students, teachers, administrators) rather than to view them as rules to be imposed on students who have grown up with ubiquitous computing and therefore have different values and behaviors that need required correcting.

The shortened nature of this study was not able to ascertain whether or not student perceptions of their own behavior can come into alignment with their actual behavior. A longitudinal study coupled with a format that provides students a reflection and a formal feedback loop would be a likely next step. By doing so, it would become more clear if it is

possible for students to understand the actuality of their behavior, and if so how much time and reflection is necessary to do so.

Future studies may want to look at how a student's underlying beliefs concerning who is responsible for their on-task behavior affects that very behavior in a variety of conditions. Where these beliefs come from, whether they can be altered, and what effect they may have on student's as they move to other phases of their lives are also topics of interest and warrant future attention. For students to be successful in many of today's student-centered educational models (such MCL and PBE) students need to be able to make independent progress during class time especially when these models are coupled with 1:1 computing.

Personal Learning Reflection

The scope of this project became larger than intended. In each phase I thought I had a clear vision of the parameters of my research and a clear path from where I stood to where I needed to arrive. Given the time constraints evident in my life, which are not unlike those of others in my profession with children who also coach and and advise extracurriculars, serve on committees and attempt to have a life outside of work, I was truly attempting to keep this project from becoming all-consuming, but I failed repeatedly and wildly and I enjoyed nearly every minute of it. Despite the ultimate findings of this project which are disappointing in that they are in part inconclusive, I have been thoroughly swept up in the journey.

As a teacher researcher I have found myself inspired, galvanized and empowered. Understanding that the work I have been involved in may help contribute to a larger discussion, benefit those within my school as well as those outside of it, and that I have been able to take on and complete such a large academic task has been a great source of pride and confidence.

It has also once again caused me to step back and look in awe at the scope of an educator's job and all the aspects that must be juggled. I have also gained an appreciation for the choices made by professionals in my field both in fulfilling roles as teachers and administrators. I find I often try to make decisions based on philosophical considerations even at the cost of practical ones. This decision matrix often has great impacts upon my professional and personal schedule at times causing both to suffer. In the midst of this study, Hapara, an application and service we use, added focused browsing, a feature that does not allow students to be off a prescribed task. Use of this feature negates, at least in part, some of the problems and concerns this study focuses on, but it does not solve them. I firmly believe that high school students need to learn when and how to control themselves and their impulses in order to get the most out of their educational opportunities. Additionally, I understand that forced and even voluntary compliance is not the same as engagement. Students need to be engaged, but they also need to learn how to make themselves available for engagement and to enter a state where they are willing to be engaged. None of this is likely to happen if they do not have the opportunity for choice. There are times when focused browsing and similar tools make sense for classroom use, but at the upper levels of high school students one of the aims needs to be helping students self-regulate to be successful and to prepare for their next steps. This said, it would be quite easy to turn on focused browsing. A great deal of the time I spend redirecting students and making rounds to observe whether or not students' screens are on acceptable classroom tasks could be put to better use, but at the cost of students' choice. This project has solidified where I stand on issues like this one. I do not see focused browsing becoming a staple of my classroom practice.

While my convenience must play a factor at times in creating curriculum experiences for students, after all I need to eat, sleep and see my family and those experiences are only as

effective as my ability to follow through with them, I do not feel like it should be the primary motive for making decisions. I have seen convenience enter into the decisions process of educators and it was clear in the administrator's frustration years ago when he remarked that he wanted to get rid of the devices. Discussing the use of technology and the difficulties it can pose in a school setting schools can cause educators to question whether or not the pros outweigh the cons. If educators ultimately choose that the rewards are not great enough, schools risk eliminating a student resource that levels the provides equity by offering students access to the greatest democratizing agent the world has ever seen: the internet.

Studies themselves have also taken on a new definition in my eyes. Before this work when sentences like "studies say" and the " leading research indicates" were bandied about in committee meetings, I generally offered an attitude of deference. These of course were studies and they must be listened to. After spending so much time reviewing studies and conducting my own now I see them in a different light. I offer them as much deference, but now it is for the work entailed and not necessarily the results. There are so many aspects of a study that are often not offered when discussing their results: is the research site similar to ours?, how was the study conducted?, what types of data was collected?, what was the scope of the study? Instead, the statement is too often left as the "research says" and not questioned further. Without further discussion the conclusions made based on what "the studies say" may be disingenuous. Rather than letting "leading research indicates" stand as an opaque statement in the future I will be asking more questions.

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Appendices

Appendix A - Administrator Consent

Dear Superintendent Carlton,

As you are aware, I have been working to earn a Masters in Educational Leadership from the University of Maine at Farmington. To complete the work for my degree I am tasked with conducting a research project. My project involves researching the role a productivity application can play in our students digital engagement. Research will begin in December, pending IRB approval and will conclude with a presentation on campus in May. Consenting participants for this research will be drawn from my English III and English IV classes. Students will be reflecting on their in-school digital engagement using a productivity application to inform their responses. The application, RescueTime, that we will be making use of has already been approved by Norma-Jean Audet, our Technology Director.

Given the information above, I ask that you grant me permission to gather data from our students. Data will be gathered in three phases. Students will be surveyed prior to using the application, surveyed over the course of their use of the application, and surveyed once more at the completion of our use of the application. Students may opt to aid the research process by responding to open-ended questions. The results of this study will be published in a public forum at the Farmington campus, presented to the English Department, made available to our faculty, and possibly published in other settings at a later date. No identifying student information will be contained or reported in any of these publications or forums.

Students who are 18 or older and parents of students under 18 will be informed of the nature of my research and the appropriate consent forms will be furnished and collected. Both students and their parents will be informed that their participation is wholly voluntary and that grades will not be impacted by the decision to participate or not participate.

If you have any further questions please do not hesitate to contact either myself or my faculty adviser, Dr. Chris Strople at christopher.strople@maine.edu. You may also contact Dr. Karol Maybury/UMF IRB Chair at karol.maybury@maine.edu.

I have reviewed Jeremy Young's research plan for "Increasing Technology Engagement in the Mass Customized Secondary Classroom" and give my consent to allow this research to be conducted in RSU#4 in the spring of 2018. I am aware that I can review the data and discuss the research project at any point during the research. I may also ask to view the report at the end of the study.

_____ _____ _____

(printed name) (date) (signature)

Appendix B - Participant Consent
(Students 18 and Older)

Please return on or by
February 5th for White Day Students
February 6th for Red Day Students

Dear Student,

As you may know, I am a graduate student in my final year at the University of Maine at Farmington. The Master's program requires me to conduct a research project. I have chosen to study student academic technology engagement because of its effect on achievement.

If you agree to be in this study, you will be asked to make use of an application called RescueTime on your chromebooks. You will be shown how to configure the app and will be given time in class to do so. You will take part in a series of short surveys over the coming weeks that will be administered as exit slips. Surveys in the first two phases of the research will take no longer than 2 minutes of your time. The final survey, to be given as we end the study, will be slightly longer.

There will be no penalty for not participating in this research study. Your grade will neither be positively impacted nor negatively impacted by this study. There are no risks to those who participate. It is expected that those who choose that participate in the study will have a better understanding of their use of class time.

By signing this paper, you consent to participate by using the RescueTime application and submitting information via survey. You may cease participation at any time if you wish.

If you have any further questions please do not hesitate to contact either myself or my faculty adviser, Dr. Chris Strople at christopher.strople@maine.edu. You may also contact Dr. Karol Maybury/UMF IRB Chair at karol.maybury@maine.edu.

Jeremy Young
English Teacher
Oak Hill High School
jeremy.young@rsu4.org
375-4950 x126

_____ _____ _____

(printed name) (date) (signature)

Appendix C - Participant Consent
(Students 17 and Younger)

Please return on or by
February 5th for White Day Students
February 6th for Red Day Students

Dear Student,

As you may know, I am a graduate student in my final year at the University of Maine at Farmington. The Master's program requires me to conduct a research project. I have chosen to study student academic technology engagement because of its effect on achievement.

If you agree to be in this study, you will be asked to make use of an application called RescueTime on your chromebooks. You will be shown how to configure the app and will be given time in class to do so. You will take part in a series of short surveys over the coming weeks that will be administered as exit slips. Surveys in the first two phases of the research will take no longer than 2 minutes of your time. The final survey, to be given as we end the study, will be slightly longer.

There will be no penalty for not participating in this research study. Your grade will neither be positively impacted nor negatively impacted by this study. There are no risks to those who participate. It is expected that those who choose that participate in the study will have a better understanding of their use of class time.

By signing this paper, you consent to participate by using the RescueTime application and submitting information via survey. You may cease participation at any time if you wish.

This agreement is contingent upon your parent or guardian's consent.

If you have any further questions please do not hesitate to contact either myself or my faculty adviser, Dr. Chris Strople at christopher.strople@maine.edu. You may also contact Dr. Karol Maybury/UMF IRB Chair at karol.maybury@maine.edu.

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_____ _____ _____

(printed name) (date) (signature)

Appendix D - Parent Consent

Please return on or by
February 5th for White Day Students
February 6th for Red Day Students

Dear Parent/Guardian,

My name is Jeremy Young and I am your child's English teacher. I am also a graduate student at the University of Maine at Farmington. To complete my Master's Degree I am conducting a research project studying student academic technology engagement. I have chosen to study student academic technology engagement because I believe technology in the classroom can be a positive force in the classroom when utilized correctly.

Through the research study students will be asked to use RescueTime, an application on their laptops to inform their understanding of their laptop use while in school. Students will complete a series of small surveys reflecting on the applications reports over the course of the study.

There will be no penalty for your child not participating in this research study. Their grade will neither be positively impacted nor negatively impacted by the study. Students will be shown how to configure the RescueTime Application so that it only captures their computer use during regular school hours. They will also have additional time to ask questions about the use of the application as needed.

Thank you for considering to allow your child to participate in this project. I believe that the study will help students become more aware of their use of technology during the school day. If you have any further questions please do not hesitate to contact either myself or my faculty adviser, Dr. Chris Strople at christopher.strople@maine.edu. You may also contact Dr. Karol Maybury/UMF IRB Chair at karol.maybury@maine.edu.

Jeremy Young
English Teacher
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375-4950 x126
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By signing this you give your consent for your child's participation in this study by using the RescueTime application and submitting information via survey.

_____ _____ _____

(printed name) (date) (signature)

Please return signed forms by sending them by mail to the school or by having your student return them directly to me.

Appendix E - Phase 1 Survey

Student Code: _____

What percentage of class time do you believe you use your laptop for tasks that are not class related? _____%

Do you believe that you should be more on-task during class?
(circle one) Yes No

Do you believe that you can change your behavior to be more on-task during class?
(circle one) Yes No

Appendix F -- Phase 2 Survey

Student Code: _____

According to RescueTime, what percentage of school time has been spent Productive?
_____%

Using the scale below, how well do you believe RescueTime accurately captured your laptop use?
(circle one)

I am on-task **Much Less** than RescueTime reports	I am on-task **Less** than RescueTime reports	RescueTime captured my laptop use **Accurately**	I am on-task **More** than RescueTime reports	I am on-task **Much More** than RescueTime reports

Appendix G -- Phase 3 Survey

Student Code: _____

1) According to RescueTime, what percentage of school time during this study has been spent Productive? (Look at yearly information)
_____%

2) How much time is this percentage based on? _____hours _____minutes

3) Using the scale below, how well do you believe RescueTime accurately captured your overall laptop use during this study? (circle one)

I am on-task **Much Less** than RescueTime reports	I am on-task **Less** than RescueTime reports	RescueTime captured my laptop use **Accurately**	I am on-task **More** than RescueTime reports	I am on-task **Much More** than RescueTime reports

4) How many classes are you currently enrolled in? _____

5) How many of those classes do you regularly use your laptop during? _____

6) To what extent do you believe the RescueTime application and its reports changed your in-school use of your laptop during this study? (circle one)

Unknown	Not at all	To little extent	To some extent	To a great extent

7) To what extent do you believe the RescueTime application and its reports changed your overall use of class time in school? (circle one)

Unknown	Not at all	To little extent	To some extent	To a great extent

8) How would you characterize your focus on in-class tasks during the study? (circle one)

Less focused	Slightly less focused	No Change	Slightly more focused	More focused

9) Did you find yourself trying to perform better on future RescueTime reports? (circle one)
Yes No

<over>

10) How likely are you to continue using the RescueTime application? (circle one)

Not at all Likely	Less than Likely	Likely	More than Likely	Very Likely

11) During the time of the study were you more or less distracted by your peers' computer use? (circle one)

Less distracted	Slightly Less distracted	No noticeable change	Slightly more distracted	More distracted

12a) During this research period did you use your cellphone more often in class? (circle one)

Decreased Use	Slightly Less use	No change	Slightly More use	Increased Use

12b) If you noted a change above, what caused this change?_____

_____

_____

13) What productivity score* did youtube have in RescueTime during this study? (circle one)

Very Distracting	Distracting	Neutral	Productive	Very Productive

(*See me if you need help finding this information)

14) Would you be willing to be interviewed if any of the data collected requires follow up? (circle one) Yes No

Optional Section:

15) Do you have any comments concerning this research study and / or your use of RescueTime to help monitor your on-task / off-task computer use in school?