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Implementing Technological Change: Effects on Student Learning Through Implementation of a Learning Management System for Enhanced Two-Way Communication between School, Students and Parents

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IMPLEMENTING TECHNOLOGICAL CHANGE: EFFECTS ON STUDENT LEARNING THROUGH IMPLEMENTATION OF A LEARNING MANAGEMENT SYSTEM FOR ENHANCED TWO-WAY COMMUNICATION BETWEEN SCHOOL, STUDENTS AND PARENTS

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by

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ABSTRACT

IMPLEMENTING TECHNOLOGICAL CHANGE: EFFECTS ON STUDENT LEARNING THROUGH IMPLEMENTATION OF A LEARNING MANAGEMENT SYSTEM FOR ENHANCED TWO-WAY COMMUNICATION BETWEEN SCHOOL, STUDENTS AND PARENTS

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The purpose of this project was to determine whether or not a blended learning environment that focuses mainly on incorporating core-subject standards into a current 7th grade Fundamentals of Information Technology (FIT) course can help to increase 7th grade student core-subject, academic performance. If such performance is distinguishable, the curriculum materials used to develop this project may then be used for curriculum development within the Bethel School District, 7th grade FIT program.

The product or end result of this project is an online curriculum guide titled: "Fundamentals of Information Technology Project: An Online Curriculum Guide for Bethel School District Middle School Technology Teachers." The curriculum guide is categorized into six teachable units and contains all original work produced from this project. The end result of the FIT Project is published online and contains: an overview of the results of the two project studies, lesson plans, instructional materials, materials for measuring student learning, materials for connecting teachers with parents and materials for connecting students with the community.

ACKNOWLEDGMENTS

I would never have been able to finish my project without the guidance of my committee members, help from friends, and support from my family and husband. I would like to express my deepest gratitude to my advisor, Dr. Henry Williams, for his excellent guidance, caring, and patience. I would also like to thank Diane Carver, assistant Director of Career and Technical Education at Bethel School District for guiding my research for the past several months and helping me to develop my background in the district's use of technology. Special thanks go to Tonya Narramore, Technology Curriculum Integration Specialist of the Bethel School District who was willing to participate in answering questions related to the district's choice with Learning Management Systems.

I would also like to thank my parents for their constant words of encouragement and for taking on the role of "babysitter" while I worked to finalize this project.

Finally, I would like to thank my husband, Philip who had provided me with oodles of support, standing by me through those long nights of my pregnancy and through those first few months of our child's life. Thank you, my love, for your patience and endless support and thank you for the many sacrifices you've made in order that I might complete this project. You have helped me to make this a richer product and for this I am eternally grateful

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CHAPTER I

INTRODUCTION

Background of the Project

It is no secret that the information-technology 'revolution' has led to rapid expansion across a wide range of areas in our modern world. It has led to the creation of information-rich and communication-intensive environments and in just about every facet of society, at work and at home, technology has served as a catalyst in transforming the way we live our lives (Lucas, 2008). According to a recent report published by the North American Council for Online Learning, "thirty states and more than half of the school districts in the United States offer online courses and services" (Watson, 2008, p. 2).

Benefits of Blended Learning and Growth in Online Enrollment

"In the past decade online learning has become an increasingly important component of K-12 education" (Watson, 2008, p. 3). What is giving rise to this increase? For the most part, online learning is meeting certain demands—a demand among students and a demand within districts (Project Tomorrow, 2005, pp. 1-6). In their study, the Speak Up project-Project Tomorrow (a national education nonprofit organization), in collaboration with Blackboard Inc. estimates that,

> almost half of 6-12th graders have researched or are interested in taking an online class, and more than 40% believe that online classes should be part of an ideal school, yet only one in ten 6-12th grade students have taken an online class through their school. (Project Tomorrow, 2005, p. 1)

Furthermore, over these past few decades, there has been an increase in the number of teachers utilizing Internet-based content and resources in their classrooms.

> This evolution has often been driven by a small number of tech-savvy teachers and technology coordinators seeking new ways to provide enriching content and to extend learning beyond the walls of the school and the confines of the school day. (Watson, 2008, p. 3)

Increased interest by both students and teachers is not the only factor driving this growth in online course enrollment. Research demonstrates "that properly implemented technology initiatives can improve student achievement, engage the digital native learner, and provide important technological skills to the future workforce" (Grinager, 2006, p. 9).

A September 2010 study by the U.S. Department of Education, notes that students who blended learning—or hybrid learning—produce equivalent, or better, learning outcomes than students participating in face-to-face education (U.S. Department of Education Office of Planning, Evaluation, and Policy Development, 2010, xv). According to a November 2006 publication from the National Conference of State Legislatures, titled "How Education Technology Leads to Improved Student Achievement," there are several studies which indicate that specific, well-implemented use of technology in an educational setting yields improved student achievement (Grinager, 2006).

In fact, a 1994 study conducted by researcher James Kulik showed on average that students who used computer-based instruction scored at the 64th percentile on tests of achievement in comparison to students without computers who scored at the 50th percentile (Kulik, 2002, p. 3).

John Schacter's paper, "The Impact of Education Technology on Student Achievement," summarized numerous studies regarding the impact of various technologies on student achievement (Schacter, 1999).

In 1998, Jay Sivin-Kachala reviewed 219 research studies from 1990 to 1997 to assess the effect of technology on learning and achievement across all learning domains and all ages of learners. His studies revealed "that the use of technology as a learning tool can make a measurable difference in student achievement, attitudes and interaction with teachers and other students" (Sivin-Kachala, p. 6).

A 1994 study of the Apple Classrooms of Tomorrow (ACOT), by Baker, Gearhart, and Herman "assessed the impact of interactive technologies on teaching and learning in five school sites across the nation (e.g., California, Tennessee, Minnesota, and Ohio)." From their analysis they found that:

> The ACOT experience appeared to result in new learning experiences requiring higher level reasoning and problem solving, although the authors claim this finding was not conclusive. ACOT did have a positive impact on student attitudes and did have an impact on changing teacher teaching practices toward more cooperative group work and less teacher stand-up lecturing. (Schacter, 1999, p. 5)

Many more examples of such studies which compare use of specific technologies to student academic achievement may be found in Grinager's as well as Schacter's publications on the subject; however, we must be reminded that:

> As with all educational interventions and practices, a definitive relationship between computer use and student achievement is challenging to identify and

> quantify since the link may depend on how the technology is used as well as on how achievement is defined and measured. (Grinager, 2006, p. 7).

Nonetheless, school districts around the nation who are faced with dismal budgets and imminent teacher shortages find these results appealing thus turning to blended learning for part of the solution (Horn & Staker, 2011).

Core-Subject Standards

With great increase in the use of blended learning environments should also bring greater awareness to teachers of middle school Information Technology courses that while teaching Information Technology, core-subject curriculum concepts do not need to fall under the waste side and can easily be incorporated into any middle school Information Technology program to enhance student academic performance in core subjects while teaching Washington State Technology standards (Meeder & Suddreth, 2012).

In order to understand why core-subject standards are essential to incorporate into middle school Technology courses, one must first have a basic understanding of the concept of the core-subject curriculum. According to Spivey, in her handout "What is the Meaning of a Core Curriculum vs. Common Core?" she described that in a public school setting, a common core curriculum is,

> a curriculum shared by all schools having adopted it [and] will bind school professionals across the nation together in working toward the same goals. Everyone will work in concert. Teachers will no longer have to guess what will be on student assessments; if they teach the Common Core Standards, the students will be prepared. (Spivey, 2013, p. 2)

State standards help to provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy (Pearson Education, Inc., "Understanding the Common Core State Standards Initiative," 2014).

The Importance of Incorporating Core-Subject Standards into Middle School Technology Courses

To date, forty-three states have aligned their education systems with the Common Core State Standards (CCSS) in support of the goal of graduating all students ready for college, careers and life (Common Core State Standards Initiative, 2014). At the state and local levels, it has been suggested that Career and Technical Education leaders "should maximize this opportunity to finally break down the silos between their disciplines and collectively find ways to ensure that the new standards rigorously engage all students in both academic and CTE courses" (Meeder & Suddreth, 2012, p. 3).

> Today, 46 states and Washington, DC, are engaged in implementation of the new Common Core State Standards (CCSS), which affects instructional materials, curricula, professional development and assessment. The CCSS identify the knowledge and skills students need at each grade level, providing potential opportunities for CTE educators to share their expertise around project-based learning and the application of content to their colleagues in mathematics, English and other affected disciplines (p. 4).

Technology Framework and the FIT Course

As a teacher of the new Bethel Public School District Fundamentals of Information Technology course, I attest that I am given the unique opportunity to develop my own course curriculum using my expertise of blended and project-based learning while integrating the Bethel Public School District FIT Framework and simultaneously incorporating core-subject standards into the course curriculum I create.

The FIT Framework was developed and adopted by the Bethel Public School District in August, 2013. This exploratory framework is aligned with the school district's "Information Technology Career Pathway" and outlines what students of the FIT course should know and be able to do after having attended a trimester-long (70-hour) FIT course. The framework is categorized into six teachable units. Each unit is aligned with Washington State Core standards as well as Washington State Educational Technology standards and Career and Technical Education (CTE) Program Standards. Though each of the six units lists various competencies to be taught by the FIT teacher, individual lessons aligned with such competencies are to be created by the FIT teachers themselves (Fundamentals of IT 2013, August 29, 2013).

I am one of two certified CTE, FIT teachers within the Bethel Public School District. Some of the lesson plans I have developed for my trimester-long, 7th grade FIT course for the 2013-2014 school year were based on mutual ideas between my colleagues in mathematics, English, Science and Humanities in order to accomplish the overall goal of supporting my students, district and community and becoming a part of the positive change in student academic performance within Bethel Public School District.

Purpose of the Project

The purpose of this project was to determine whether or not a blended learning environment that focuses mainly on incorporating core-subject standards into a current 7th grade FIT course can help to increase 7th grade student core-subject, academic performance. If such performance is distinguishable, the curriculum materials used to develop this project may then be used for curriculum development within the Bethel School District, 7th grade FIT program.

This project is an online curriculum guide titled: "Fundamentals of Information Technology Project: An Online Curriculum Guide for Bethel School District Middle School Technology Teachers." The curriculum guide is categorized into six teachable units and contains all original work produced from this project. Throughout this paper, said curriculum guide is referred to as the "FIT Project." The FIT Project is published online and contains: an overview of the results of the two project studies, lesson plans, instructional materials, materials for measuring student learning, materials for connecting teachers with parents, and materials for connecting students with the community.

In this project, technology-enhanced blended learning is defined as face-to-face teaching and learning supplemented by an online component delivered through a learning management system (LMS). In this blend, the amount of face-to-face class time is not reduced and replaced by online learning activities, but remains the same.

The first goal of the project is to describe the LMS that the Bethel Public School District has elected to use for its blended learning courses. The second goal of the project is to describe the four models of blended learning that have become most prominent across K-12 schools, then to describe the reasons why one blended learning environment

was chosen over another when implementing a blended learning environment into the 7th grade FIT course. The third goal of the project is to provide a brief background on the current Washington State 7th grade, core-subject learning standards for English Language Arts and Mathematics. An additional goal is to establish ways in which the use of a LMS in blended FIT classes helps to increase student core-subject academic performance as well as student state test performance.

Significance of the Project

The 2012-2013 Washington State Achievement Index revealed that statewide, 34% of Washington public schools ranked as only "Fair" or "Struggling", while 26%, ranked as either "Excellent" or "Very Good" (Finne, February, 2013).

Though the aforementioned statistics on statewide academic achievement trends show as improving between the years 2010 and 2013, these local and statewide results are both included in this project to demonstrate that low academic performance is widespread both in and around the Bethel Public School District.

Again as indicated above, the 2013 average proficiency indicator for Liberty Middle School was classified as "good" with a rating of 6.20, and the 2013 average growth score for Liberty Middle School is classified as "fair" with a rating of 5.50 (Office of Superintendent of Public Instruction, 2014). However, when viewing the data for the "targeted subgroups," the 2012 Achievement Index indicates that on average, the students of Liberty Middle School who fall into the "targeted subgroups" category achieved a proficiency average of 5.16 (classified as "fair proficiency"). These same students who fell into the "targeted subgroups" category displayed a growth average of 5.50 (classified as "fair growth"). Furthermore, the results of this same achievement

index also show students as having lower proficiency in both Math and Science when compared to other subjects such as reading and writing. (Office of Superintendent of Public Instruction, 2014).

According to the Washington State Board of Education, "for the purposes of the Achievement Index, "targeted subgroup" refers to students who are on an Individual Education Plan (IEP), are English Language Learners (ELL), Former ELL, or are eligible for Free or Reduced-Price Lunch (FRL)" (Washington State Board of Education, 2014).

Limitations of the Project

Limitations for this project include not having access to a LMS other than the one chosen by the Bethel Public School District. Thus, LMS's could not be compared. Additionally, blended learning environment could also not be chosen for the purpose of this project. Due to district financial constraints as well as the socio-economic dynamics of the community (both of which are explained further in the later portion of this project), implementation of the station-rotation blended learning environment posed as the only logical choice from the list of blended learning environments to implement.

Definition of Terms

Achievement Gap: For the purpose of this study, the phrase Achievement Gap is the difference between the test scores of minority and/or "low-income students and the test scores of their White and Asian peers" (Adams, 2003, iii).

Average Proficiency Indicator: For the purpose of this study, the phrase Average Proficiency Indicator is a "combination of proficiency in reading, mathematics, writing and science. Subjects will be weighted equally to calculate the Proficiency Indicator" (Cee, 2014, p. 2).

Bethel Public School District: For the purpose of this study, Bethel Public School District is the "13th largest district in Washington State" with an estimated enrollment of nearly 18,000 students. Bethel Public School District "covers over 215 square miles" within southeast Pierce County and is comprised of fifteen elementary schools, five junior high schools, three senior high schools, an alternative junior high/high school and an online academy (Low, 2014, p. 2).

Blackboard Inc.: For the purpose of this study, Blackboard Inc. is a technology company a web-based course-management system designed to allow students and faculties to participate in classes delivered online or use online materials and activities to complement face-to-face teaching (Coopman, 2009).

Blended Learning: For the purpose of this study, the term Blended Learning is a term "applied to the practice of using both online and in-person learning experiences when teaching students" (Great Schools Partnership, n.d., para. 2).

Blogs in Moodle: For the purpose of this study, Blogs in Moodle is a contraction of 'web log'. "Blogs are a form of online journal used by millions of people around the world for self-expression and communicating with family and friends. Blogs in Moodle are user based where each user has his/her own blog" (Moodle Docs, 2010, para. 1).

Bloom's Taxonomy: For the purpose of this study, Bloom's Taxonomy is "a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding" (Great Schools Partnership, 2014, para. 7).

Brick-and-Mortar School: For the purpose of this study, the phrase Brick-and-Mortar School is a "traditional school or traditional school building, as contrasted with an online school" (DoDEA Virtual High School, n.d. , para. 2).

Career and Technical Education (CTE) Program Standards: For the purpose of this study, the CTE Program Standards are standards designed to prepare "both youth and adults for a wide range of careers and further educational opportunities" (Career and Technical Education Foundation, n.d., p. 4).

College and Career Readiness: For the purpose of this study, College and Career Readiness defines the "content knowledge, skills, and habits that students must possess to be successful in postsecondary education or training that lead to a sustaining career" (Educational Policy Improvement Center (EPIC), n.d. , para. 2).

Common Core Standards (CCSS): For the purpose of this study, the CCSS are a set of academic standards in mathematics and English language arts/literacy (ELA).

> These learning goals outline what a student should know and be able to do at the end of each grade. The standards were created to ensure that all students graduate from high school with the skills and knowledge necessary to succeed in college, career, and life, regardless of where they live. (Common Core State Standards Initiative, 2014, para. 11)

Constructivist Learning Theory: For the purpose of this study, the Constructivist Learning Theory is a type of learning theory that "explains human learning as an active attempt to construct meaning in the world around us" (Conrad, 2011, para. 2).

Core Academic Performance: For the purpose of this study, the phrase Core Academic Performance describes "students' academic achievement in core subjects" (Oluwatimilehin , & Owoyele, 2012, para. 2) .

Database Activity in Moodle: For the purpose of this study, a Database Activity in Moodle is a module which "allows the teacher and/or students to build, display and

search a bank of record entries about any conceivable topic". The format and structure of these entries can be almost unlimited, including images, files, URLs, numbers and text amongst other things (Point Learning, n.d., para. 11).

Diagnostic Pre-Assessment: For the purpose of this study, a Diagnostic Pre-Assessment is an assessment which can help you identify your students' current knowledge of a subject, their skill sets and capabilities, and to clarify misconceptions before teaching takes place (Northern Illinois University, n.d., para. 2).

Educator Access Plus: For the purpose of this study, Educator Access Plus is an online tool designed to give teachers, advisors and administrators access to student information (Washington School Information Processing Cooperative, 2013).

E-Journal: For the purpose of this study, an E-Journal is an online equivalent of a print journal. It provides the full-text of articles, usually in PDF or HTML format. Much like a digital diary, an e-journal can be a place for recording one's mission and values, goals, challenges, brainstorms etc. (Mercer, 2000).

E-Portfolio: For the purpose of this study, an E-Portfolio is a "purposeful aggregation of digital items - ideas, evidence, reflections, feedback etc, which 'presents' a selected audience with evidence of a person's learning and/or ability" (Northumbria University on behalf of Jisc., 2014, para. 17).

English Language Learners (ESL) and an ESL Program: For the purpose of this study, the phrase ESL Program is an English language study program for nonnative speakers (ApplyESL.com, 2013).

Explanatory Case Study: For the purpose of this study, the phrase Explanatory Case Study is a study that attempts to explain why certain behaviors occurred.

Explanatory case studies not only explore and describe phenomena but can also be used to explain causal relationships and to develop theory (Sage Publications, n.d.).

Exploratory Track: For the purpose of this study, the phrase Exploratory Track refers to "exploratory courses allowing students to get an idea of what a particular industry is like, which will help them decide if they are interested in pursuing a career in that field" (Mcneely, 2011, para. 1).

Face-To-Face Education: For the purpose of this study, the phrase Face-To-Face Education is "instruction where the instructor and the students of educational institution are in a place devoted to instruction and the teaching and learning take place at the same time" (Purdue University, n.d., para. 3).

Flipped-Classroom: For the purpose of this study, a Flipped-Classroom is a form of blended learning where a "student is first exposed to new material outside of class, usually in the form of an online presentation. When the student attends class in a brick-and-mortar setting, the class time is used to apply the material in the form of problem-solving and discussion" (Panopto, 2013, para. 4).

Forum Module in Moodle: For the purpose of this study, the Forum Module in Moodle is "an activity where students and teachers can exchange ideas by posting comments" (Moodle Docs, 2014, para. 5).

Free and Reduced Lunch: For the purpose of this study, Free and Reduced Lunch is a program that aims to help students who are from households who qualify by income to receive free or reduced-price lunch at their school (New America Foundation, 2014).

FIT Framework: For the purpose of this study, the FIT Framework is an exploratory framework aligned with the school district's "Information Technology Career

Pathway" and outlines what students of the FIT course should know and be able to do after having attended a trimester-long (70-hour) FIT course. The framework is categorized into six teachable units (Fundamentals of IT 2013, August 29, 2013, p. 1).

Goal-Oriented Learning: For the purpose of this study, the phrase Goal-Oriented Learning is a purposeful activity that requires the learner to have a reason or direction for taking part in the instructional process (Infed.org, n.d.).

Growth Model Data: For the purpose of this study, the phrase Growth Model Data is a term to describe "student's relative academic performance to each other and is measured as a percentile. This value is called the Student Growth Percentile or SGP. Separate SGP determinations are made for Reading and Math" (Nevada Department of Education, 2011, para. 1).

Hybrid Learning: For the purpose of this study, the phrase Hybrid Learning is also referred to as "blended learning" or "mixed-mode learning" (see blended learning). (Great Schools Partnership, n.d., para. 3).

IEP (Individual Education Plan): For the purpose of this study, the phrase IEP can be used to describe "students who are receiving special education services" (U.S. Department of Education, 2014, para. 10).

International Society for Technology in Education (ISTE) Standards: For the purpose of this study, ISTE Standards are standards (formerly the NETS) for Computer Science Educators (CSE) are the "standards for evaluating the skills and knowledge that computer science educators need to reach, inspire and teach students in computing" (International Society for Technology in Education, 2014, para. 8).

Intrinsic Case Study: For the purpose of this study, the phrase Intrinsic Case Study is "the study of a case (e.g., person, specific group, occupation, department, organization) where the case itself is of primary interest in the exploration" (Mills, Durepos, & Wiebe, 2010, para. 1).

Learning Management System (LMS): For the purpose of this study, an LMS is "a software-based platform that provides infrastructure, framework and tools to facilitate online learning or training" (Litmos Learning Management System, 2014, para. 5).

Learning Modalities: For the purpose of this study Learning Modalities are the "sensory channels or pathways through which individuals give, receive, and store information. Perception, memory, and sensation comprise the concept of modality. The modalities or senses include visual, auditory, tactile/kinesthetic, smell, and taste" (Gilbert & Bulgrin, n.d., p. 5).

Learning Modules: For the purpose of this study, Learning Modules "allows online course designers to organize and deliver content, such as assessments, assignments, quizzes, and content files to Students" (Cumberlan Community College, n.d., para. 1).

Levy (Education): For the purpose of this study, a Levy is the amount of money a school district requests from property tax. School districts are funded from three main sources: The state, the federal government, and local levies and bonds.

> A levy helps pay for the day-to-day operations of school districts including educational programs, safety and security, utilities, transportation, textbooks, athletics, etc. It is a way for local communities to supplement State and Federal

funding which fall short of providing for all that is required. (Wapato Schools, n.d., para. 6)

"Low-Income" Households: For the purpose of this study, "Low-Income" Households are households whose children are eligible for Free and Reduced Lunch indicated by their household gross income which must fall within the "free limits" per U.S. Federal Income Eligibility Guidelines (Community Health Center, 2014, para. 12).

Mixed-Mode Learning: For the purpose of this study, the phrase Mixed-Mode Learning is also referred to as "blended learning" or "hybrid learning" (see blended learning) (Great Schools Partnership, n.d., para. 9).

Moodle: For the purpose of this study, Moodle is "a free, open-source PHP web application for producing modular internet-based courses that support modern social constructionist pedagogy" (Alexa Internet, Inc., n.d., para. 1).

Office of Superintendent of Public Instruction: For the purpose of this study, OSPI is the "state education agency for the State of Washington" (Washington Reading Corporation, 2011, para. 2).

Project-Based Learning (PBL): For the purpose of this study, Project-Based Learning is a "dynamic classroom approach in which students actively explore real-world problems and challenges and acquire a deeper knowledge" (Edutopia, 2013, para. 1).

Quasi-Experimental Research: For the purpose of this study, the phrase Quasi-Experimental Research defines "a type of evaluation which aims to determine whether a program or intervention has the intended effect on a study's participants" (National Center for Technology Innovation, 2011, para. 3).

Scaffolding: For the purpose of this study, the phrase Scaffolding means "a variety of instructional techniques used to move students progressively toward stronger understanding and, ultimately, greater independence in the learning process" (Great Schools Partnership, 2014, para. 1).

Smarter-Balanced Assessment: For the purpose of this study, Smarter-Balanced Assessment is a bipartisan, state-led group developing assessments aligned to the Common Core State Standards (Office of Superintendent of Public Instruction, 2014).

Special Needs Student: For the purpose of this study, the phrase Special Needs student is a term used to "collectively define those that require assistance due to physical, mental, behavioral, or medical disabilities or delays. Individualized Education Program is the written description of an appropriate instructional program for a student with special needs" (California Teachers Association, 2011, para. 2).

Station-Rotation Blended Learning Environment: For the purpose of this study, the Station-Rotation Blended Learning Environment is a "rotation-model implementation in which within a given course or subject (e.g., math), students rotate on a fixed schedule or at the teacher's discretion among classroom-based learning modalities" (Staker & Horn, 2012, p. 8).

Student Growth: For the purpose of this study, the phrase Student Growth is defined by RCW 28A.405.100 as "the change in student achievement between two points in time. It also states student growth data must be a substantial factor in evaluating the summative performance for at least three of the evaluation criteria for both teachers and principals" (Washington State Legislature, 2011, para. 4).

Summative Post-Assessment: For the purpose of this study, the phrase Summative Post-Assessment is an "assessment which takes place after the learning has been completed and provides information and feedback that sums up the teaching and learning process" (Northern Illinois University, n.d., para. 2).

Targeted Subgroups: For the purpose of this study, the phrase Targeted Subgroups is classified as "American Indian/Alaskan Native, Black, Hispanic, Pacific Islander, Current English Language Learner, Former English Language Learner, Special Education, and Low Income students" (Achievement Index, 2014, para. 5).

Title I: For the purpose of this study, Tile I is a "section of the Federal Elementary and Secondary Education Act (ESEA) that is aimed at helping low-income students who are at risk of failing in school" (U.S. Department of Education, 2013, para. 2).

Value Added Assessment: For the purpose of this study, the phrase Value Added Assessment allows researchers to identify not only the progress made by individual students, but also the extent to which individual teachers, schools, and districts have contributed to that progress (The Center for Greater Philadelphia, 2004).

Washington State Achievement Index: For the purpose of this study, the Washington State Achievement Index is,

> designed as a unified state and federal system intended to meaningfully differentiate among schools. It is a snapshot of a school's performance based on statewide assessments and can be used to compare how a school performs in reading, writing, math, science, and graduation rates. (Office of Superintendent of Public Instruction, 2014, para. 1)

Washington State Educational Technology Standards: For the purpose of this study, the Washington State Educational Technology Standards are standards "developed as grade level expectations for digital technologies, the new standards work compatibly, and practically, within the current teaching and learning environment" (Office of the Superintendent of Public Instruction, 2013, para. 2).

WebCT (Web Course Tools): For the purpose of this study, WebCT is a software product which enables online course management on a large scale by an institution, controlling courses, content, and user access to courses. WebCT was purchased by Blackboard Inc. 2006 (Subramanian, Zainuddin, & Alatawi, n.d.).

Wikis: For the purpose of this study, wikis are "a collection of collaboratively authored web documents where multiple users can add to and edit freely online" (Konieczny, 2007, para. 1).

Organization of Project

This project consists of five chapters. The first chapter introduces the project by defining blended learning, and presenting motivation for the project, its purpose and significance. Chapter 2 reviews the literature on blended learning and various blended learning environments, provides the rationale behind using a particular content management system when attempting to develop an effective blended learning environment, describes the current Washington State 7th grade core-subject standards, and state educational technology standards and lists four research questions used to substantiate the quasi-experimental research. Chapter 3 introduces research methodology and describes the setting, participants, and materials followed by data sources, and steps taken in the data analysis. Chapter 4 exhibits visual artifacts of the project and discusses

the results of the quasi-experimental research by means of using the same research questions described in Chapter 2. Chapter 5 then summarizes the results and brings into discussion limitations and implications. The chapter ends with directions for future research and general conclusions.

Summary

Curtis (2014) asserted that, "considering the current condition of Washington State's academic achievement and growth, Washington State educators may find their students exhibit positive, academic growth if taught within a blended learning environment that incorporates core-subject standards and serves all students" (2014). Thus as a teacher of the FIT course with the charge of creating a FIT curriculum for Liberty Middle School, I find it worthwhile to explore the effects (if any) of fostering such a learning environment with aims to support my students, my district and my community and to become a part of the state-wide, positive change in student academic performance that our state desperately needs.

Data obtained from this project may lead to future, enhancements to the Bethel Public School District FIT curriculum so as to positively influence student core-subject, academic performance.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Introduction

This chapter offers the context for the research presented in this project. Chapter 2 begins with a review of the literature on blended learning. A description is provided for each of the four models of blended learning which have become most prominent across K-12 schools. These descriptions provide an important context for the reasoning behind the specific blended learning model chosen for this project. Next, the phrase "learning management system" is defined as it relates to blended learning and an explanation is provided of the LMS with which the Bethel Public School District has elected to use for the majority of its blended learning courses. Subsequent to the aforementioned section lists the current, state-adopted, core-subject 7th grade learning standards. The project then aims to explain the Washington State Educational Technology Standards as they relate to grade 7. An additional section of this chapter investigates whether or not specific use of the Station-Rotation blended learning environment combined with the use of the Moodle LMS and the inclusion of both core-subject standards into the current technology curriculum may yield increased student academic performance.

According to Engrossed Substitute House Bill 2261 [ESHB 2261 (2009)] concerning the state's education system, as of 2009, the State Board of Education has been responsible for creating and "implementing a statewide accountability system that includes identification of successful schools and districts, those in need of assistance, and those in which state intervention measures are needed". This Index is to complement and potentially replace the federal accountability system for the purposes of recognition of

schools and for schools and districts to self-assess their progress (H.R. ESHB 2261, 2009). Furthermore, according to Engrossed Second Substitute House Bill 6696 [E2SSB 6696 (2010)] regarding education reform, the new Washington State Achievement Index is to be used to recognize schools for closing achievement gaps, to identify schools in need of improvement, to create a Required Action Process for persistently low-achieving schools and to develop an accountability framework (H.R. E2SSB 6696, 2010).

One of six tiers is assigned to a public school based on that school's accountability index score. However, schools and districts would initially fall into five tiers based on their achievement index score, with an in-depth analysis of the data and conditions of those in the "struggling" tier to determine if they merit being placed in a sixth "Priority" tier to then be eligible to receive more intensive support. The current, state-adopted achievement index ranges from a scale of one to ten where an index range of 1 indicates the lowest performance level and an index range of 10 indicates the highest performance level. With regards to student proficiency, if a Washington State public school falls under the achievement index range of 7.85 to 10.00 it is considered performing "exemplary"; 6.81 to <7.85 a school is deemed "very good"; 5.86 to <6.81 a school is labeled as "good"; 4.84 to <5.86 a school is seen as "fair" and 3.77 to <4.84 a school is seen as "struggling." If a school scores at a range of less than 3.77, it is placed in the "priority" tier (Washington State Achievement Index Site, 2014).

In July 2012, the Washington State Board of Education and the Office of the Superintendent of Public Instruction,

> began to revise the Achievement Index to include student growth data and college and career readiness indicators. This data will provide a better way to view school

> performance, measuring not only how many students meet state proficiency standards, but also how much and how quickly students are learning. (Washington State Achievement Index Site, 2014)

In 2013, the Washington State Achievement 2012-2013 Index Rating for Liberty Middle School of the Bethel Public School District was 5.78, classifying the school's school-wide proficiency as "fair." However again noting that the proficiency and growth scores are now listed separately, the 2013 "average proficiency indicator" for Liberty Middle School is classified as "good" with a rating of 6.20, while the 2013 "average growth" score for Liberty Middle School is classified as "fair" with a rating of 5.50 (Office of Superintendent of Public Instruction, 2014).

> According to the Washington State Board of Education,
>
> schools characterized as 'Fair' may have some areas of success but require substantial improvements. School Improvement Plans focus on meeting the needs of all students and closing the achievement gap among subgroups. (Washington State Board of Education, 2014, p. 1)

Academic Performance Trends within the State of Washington

The 2010 Achievement index indicates that nearly sixty percent of Washington students attended schools that rated only "fair" or "struggling". Furthermore, in that same year, less than ten percent of students attended schools rated "very good" or "exemplary" (Finne, "Policy Notes," 2011).

Liberty Middle School is one of six middle schools residing within the Bethel Public School District and the Bethel Public School District is one of thirty-five districts residing within the Puget Sound Educational Service District (PSESD) and resides within

the Tacoma, Washington area (Puget Sound ESD, 2014). In 2011, of the 161 schools in Tacoma, Puyallup, Franklin Pierce, Clover Park and Federal Way, only one school was regarded as "exemplary" – the Federal Way Public Academy. Only two schools were assessed as "very good": Twin Lakes Elementary in Federal Way and Southgate Elementary in Clover Park, forty-two schools were classified as "good", 86 as "fair" and 30 as "struggling" (Finne, "Opinion/Editorial," 2011).

Washington State defines student growth as "the change in student achievement between two points in time" (Washington State Legislature, 2011, para. 4). Northwest Evaluation Association's Measures of Academic Progress (MAP), a state-aligned computerized adaptive assessment program with efforts to provide Washington educators with the information needed to improve teaching and learning and make student-focused, data-driven decisions, clarifies that teachers should use the data "to help them streamline teaching strategies and provide differentiated instruction, and to create flexible grouping across the classroom" (Northwest Evaluation Association, 2014, p. 5). Furthermore, according to the Washington State Teacher Principal Evaluation Project concerning student academic growth, a process should be in place for establishing "rich goals and targets for students, which are educator generated, and are aligned to the statewide criteria" (Washington State Teacher Principal Evaluation Project, 2014, p. 18).

Current Trends

Blended Learning

A May 2012 white paper published by the Clayton Christensen Institute, formerly Innosight Institute, classifies blended learning as, a formal education program in which "a student learns at least in part at a supervised brick-and-mortar location away from home

and at least in part through online delivery with some element of student control over time, place, path, and/or pace" (Staker, 2011, p. 5).

Four Models of Blended Learning

Four models of blended learning have become most prominent across K-12 schools (Horn & Staker, 2011). In order for one to understand the reasoning behind why one blended learning environment was chosen over others when implementing a blended learning environment into the 7th grade FIT course at Liberty Middle School, a description of each must be provided. By observing over six dozen blended learning school environments across the country and by interviewing over one hundred educators involved in blended learning situations, in their May 2012 white paper, the researchers from the Clayton Christensen Institute arrived upon a taxonomy which categorizes four main blended learning models (Staker & Horn, 2012).

The Rotation Model

Four sub-models currently exist under the Rotation Model: Station-Rotation, Lab-Rotation, Flipped-Classroom and the Individual-Rotation Model. A "Station Rotation" model can be best described as having students rotate on a schedule among classroom-based learning modalities where students rotate through stations (i.e. full-class instruction, group projects, pencil-and-paper assignments etc), with one station designated for online learning. With regard to the station-rotation model, the rotation a student makes is fixed and not based upon a customized schedule tailored to the individual student. This means that all students must rotate through all of the stations.

With the "Lab-Rotation" model, students rotate along a static or fixed schedule among locations on the school campus. For example, a learning lab could be used

primarily for online learning while additional classrooms exist to offer other learning modalities.

A "Flipped-Classroom" model is described as students rotating on a static schedule between face-to-face, teacher-guided, practice on the school campus during the day and then after school, participate in online learning. The primary instruction for the class is online, which differentiates a Flipped Classroom from students who simply complete homework online at night.

A fourth rotation model, termed the "Individual-Rotation" model is where students rotate on fixed, individualized schedules among learning modalities, where at least one modality is online learning. Each student moves through learning modalities not necessarily rotating to each available station or modality. Students' individual schedules are made by the teacher or are based upon a certain set of rules (Staker & Horn, 2012).

Flex Model

In a "Flex" model, instruction is delivered primarily via Internet, and students move on individually customized, fluid schedules among learning modalities while the teacher provides "face-to-face support on a flexible and adaptive as-needed basis through activities such as small-group instruction, group projects, and individual tutoring. Some implementations have substantial face-to-face support, while others have minimal support" (Staker & Horn, 2012, p. 12).

Self-Blend Model

With this model, students attend an entirely online course (either at his or her brick-and-mortar campus or off-site) with a teacher who teaches the class solely online. It is important to note that with this model, students are substituting attending a brick-and-

mortar class with a face-to-face teacher for an entirely online class with an online teacher. Students are not substituting attending a brick-and-mortar campus for an entirely online school (Staker & Horn, 2012).

Enriched-Virtual Model

Students seldom attend the brick-and-mortar campus every weekday with the "Enriched-Virtual" model. This model is not a course-by-course model but their whole school experience operates this way. For example, students may choose to meet face-to-face with teachers for their first course meeting at a brick-and mortar location then complete the rest of their coursework remotely (Staker & Horn, 2012).

Adoption of a Suitable Blended Learning Environment

The Station-Rotation blended learning environment was chosen for this project based on district, school and classroom dynamics. When choosing a blended learning model to adopt for this project and the 7th grade FIT class, many considerations had to be taken into account such as: availability of the school facilities, course schedule limitations regarding how instructional time (managed by the district through the FIT Framework) was distributed throughout the trimester, students' access to reliable, connected devices at home, requirements for the physical presence of the teacher within a classroom, attributes of the LMS adopted by the district and the teacher's knowledge and skills with blended-instruction. Additionally, some blended learning models were not adopted due to various other limitations.

By exhausting the criteria formerly listed, it was fairly simple to determine which blended learning models could not feasibly be used to develop the blended learning environment for the 7th grade fit course of the Bethel Public School District.

School Facilities

As the 7th grade FIT teacher at Liberty Middle School of the Bethel Public School District, I believe the FIT course was not granted both an available learning lab for predominantly online learning and an additional classroom for other learning modalities. Thus the use of the Lab-Rotation model had to be ruled out for this particular project.

Course Schedule Limitations

As introduced in Chapter One, the Bethel Public School District has adopted its own FIT curriculum framework themselves (Fundamentals ofIT 2013, August 29, 2013). The framework states that seventy instructional hours must be taught using the following format: ten instructional hours must be devoted to teaching Unit 1 ("Introduction to Information Technology"), fifteen instructional hours must be devoted to teaching Unit 2 ("Introduction to MS Office"), fifteen instructional hours must be devoted to teaching Unit 3 ("Microsoft Word and Science Concepts"), ten instructional hours must be devoted to teaching Unit 4 ("Excel Spreadsheets and Math Concepts"), fifteen instructional hours must be devoted to teaching Unit 5 ("PowerPoint Presentations and Career Leadership"), and five instructional hours devoted to teaching Unit 6 (Integrate Office with Math and Science Concepts). Additionally, each FIT course runs through the period of one trimester. At Liberty Middle School, one FIT class period typically runs fifty-five minutes long. The Individual-Rotation model could not feasibly be adopted as the blended learning environment for this project due to course schedule limitations as it calls for each student to work at his or her own pace where students rotate on an individually, customized, fixed schedule among learning modalities. The FIT framework states specific hours of instructional time be devoted to each unit within a trimester's

period and thus, teaching using the Individual-Rotation model would prove it difficult and time-consuming to adequately accommodate all students with a customized, fixed schedule among various learning modalities (Fundamentals ofIT 2013, August 29, 2013).

Limited Availability of Equipment

The Flipped-Classroom Model could not properly be implemented with the current 7th grade FIT curriculum due to limited availability of equipment for those students who do not have reliable, connected devices at home. In the Flipped-Classroom Model, the primary content instruction is online. Based on May 2013 student demographics, forty-four percent of students attending Liberty Middle School are raised in "low-income" households (Office of Superintendent of Public Instruction, 2013). When applying this information to a technology course practicing a Flipped-Classroom model, it was impracticable to demand students have reliable, connected devices at home to access online delivery of instruction and content of the same subject on a daily basis.

Physical Presence of the Teacher

During the 2013-2014 school-year, the Bethel Public School District had not granted students the choice to enroll in the 7th Grade FIT course entirely online. The Bethel Public School District, FIT course was not offered solely online thus students were not offered the choice to attend the FIT course either on a brick-and-mortar campus or off-site.

The Blended Learning Model Adopted for this Project

Through process of elimination, the Station-Rotation model is viewed as the top model for developing a blended learning environment for the 7th Grade FIT class at Liberty Middle School as well as the top choice for this project.

Through the Station-Rotation model, students of the FIT class are able to rotate on a fixed schedule among classroom-based learning modalities. The rotation includes one station for online learning and includes other stations such as small-group activities, full-class instruction, group projects, individual tutoring, and pencil-and-paper assignments. Through this blended learning model, the entire class is able to alternate among activities together. The Station-Rotation model differs from the Individual-Rotation model because students rotate through all of the stations, not only those on their customized schedules (Staker & Horn, 2012).

Learning Management System

A learning management system (LMS) is a program created to help teachers organize and present course resources in an online format where teachers "facilitate learning by modelling and scaffolding, organizing learning networks, creating meaningful learning environments" and motivating students to act (Mällinen, 2007, p. 213).

> A LMS typically provides features such as discussion forums, video conferencing, assignments, polls, quizzes, and content management. Additionally, with LMS's, there are tools specifically intended for use by faculty for course development and management. There are tools utilized solely by students as a component of the learning process. (Tanczos, 2011)

The Learning Management System Chosen by the Bethel Public School District

As a technology teacher of the Bethel Public School District, I can attest that the Bethel Public School District has elected to use the MOODLE Learning Management System for the majority of its blended learning, K-12 courses offered. Moodle was built to be used for either fully online distance learning, or for blended learning environments in a brick-and-mortar classroom (Hanover Research, 2011).

Moodle and Its Benefits

Moodle is an Open Source LMS that was originally "designed as a guide for developing constructivist learning environments" (Antonenko, Toy, & Niederhauser, 2004, p. 2). Moodle was created by Martin Dougiamas, a former WebCT system administrator, in response to his frustrations with what he believed to be numerous inadequacies with commercial, proprietary LMS's such as Blackboard and WebCT (Ahern, 2010). Dougiamas explained how Blackboard and WebCT "lack flexibility in designing and in adding customized learning modules" (Antonenko, Toy, & Niederhauser, 2004, p. 2).

> Current advances in open source online learning environments are a response to the shortcomings of commercial products like WebCT and Blackboard. One such weakness is a lack of flexibility in designing and adding customized learning modules. With commercial products one can only include elements that the software designers deemed necessary when they developed the program. (Antonenko, Toy, & Niederhauser, 2004, p. 1)

Regarding the constructivist approach, "Moodle offers a platform where the constructivist approach can be implemented and extended to include social interaction. Its

features include tools supporting interactive activities such as assessment tasks, discussion forums, chat rooms, journals, quizzes, glossaries, and wikipedias" (Petrova, 2005, p. 19).

Reasons Influencing Bethel Public School District's Choice to Use Moodle

By means of a two-way discussion between Bethel Public School District Technology Curriculum Integration Specialist Tonya Narramore and myself, she explained to me that the Bethel Public School District selected Moodle in summer of 2011 as their district's LMS based on two criteria. The first of two was affordability. Prior to summer 2011, The Bethel Public School District had used Blackboard as their LMS for five consecutive years. Blackboard is a proprietary LMS and its use is typically limited to educators at institutions who pay a fee each year for a license agreement for its use. Narramore explained that because Blackboard builds substantial annual increases into their pricing model, the Bethel Public School District was eventually forced to switch to a more affordable option. The district adopted Moodle with an administrator hired to implement it. Due to the open source nature of Moodle, it is a web application that is simple for a Moodle Administrator to manage and free for educators at institutions to use. The option to adopt Moodle as the district's LMS was the most affordable option available to the district at the time. The second reason the school district had chosen to adopt Moodle as their LMS was due to the open source nature of the web application as it relates to continuous development by the ever-expanding Moodle community (Holtham, Rich, & Noris, 2012). As Narramore explained, due to the open source nature of Moodle, the Moodle software is constantly being revised and redeveloped.

Constructivist Learning and Moodle

In order to understand how the Moodle LMS played a key role in maintaining a Constructivist learning environment for the classroom described in this project, one must have a basic understanding of the theory of constructivism and ways in which Moodle was used to create such an environment.

The Theory of Constructivism

"Constructivism emphasizes the importance of the knowledge, beliefs, and skills an individual brings to the experience of learning" ("Southwest Consortium for the Improvement of Mathematics and Science Teaching," 1995, p. 1). When referring to constructivism in a classroom setting, it can be said that as students combine their prior knowledge, new information learned as well as their readiness to learn, they begin to construct new understanding. "Individuals make choices about what new ideas to accept and how to fit them into their established views of the world" (Southwest Consortium for the Improvement of Mathematics and Science Teaching, 1995, p. 1). Students then "become engaged by applying their existing knowledge and real-world experience, learning to hypothesize, testing their theories, and ultimately drawing conclusions from their findings" (Los Angeles Unified School District, 2013). "Constructivist approaches to teaching and cooperative learning techniques can be thought of as having both personal and interpersonal components. Each person constructs his or her own mental frameworks and conceptions using preferred learning styles" (Johnson, 2008, p. 2).

> Dialogue and collaboration through social experience are viewed as essential to constructivist learning and "language passing back and forth between individuals in written and oral forms is viewed as indispensable for the development of

understanding. (Johnson, 2008, p. 2; Jonassen, Davidson, Collins, Campbell, & Haag, 1995)

Benefits of Constructivist Learning in the Classroom

Although many view fostering of constructivist learning within a classroom as difficult, constructivist learning has many benefits (Richardson, 2003). In a well-organized constructivist environment, students can be guided to discover concepts and develop new skills. "Abstract concepts become meaningful, transferable, and retained because they are attached to performance of an activity. The activities lead to concepts; the students construct the meaning" (Cooperstein & Kocevar-Weidinger, 2004, p. 145). In their article titled, "Beyond active learning: a constructivist approach to learning," Cooperstein and Kocevar-Weidinger (2004) discuss the benefits of applying constructivist learning techniques in their lesson plans:

> These lessons have proved rewarding for our students and for us. We find (strictly anecdotally) that students are engaged, enthusiastic, productive, and motivated during class, frequently leave class with a feeling of accomplishment and confidence, and, judging by the type of help sought after the session has ended, can apply skills and concepts to subsequent activities (Cooperstein & Kocevar-Weidinger, 2004, p. 145).

How Moodle Provides Positive Conditions for Constructive Learning

Applefield, Huber and Moallem (2001) explained constructivism as a "collaborative social interaction in contrast to individual investigation of cognitive constructivism. Through the cognitive give and take of social interactions, one constructs personal knowledge" (p. 7). When applying this concept to Moodle, the Moodle LMS

provides a multitude of activities which "are constructed to allow students to control the shared, common content of courses, such as forums, wikis, glossaries, databases, messaging, etc. This stimulates students to share course experience for others" (Zsolt & István, 2008, p. 10). Many believe that when exposed to a constructivist learning environment, students are then engaged in what is called "meaningful learning" (Ayas, 2006, p. 10). Howland, Jonassen and Marra described in their book, "Meaningful Learning with Technology," five attributes of meaningful learning: Active (Manipulative/Observant), Constructive (Articulative/Reflective), Intentional (Goal-Directed/Regulatory), Authentic (Complex/Contextual), and Cooperative (Collaborative/Conversational) and how these five attributes help to inform instructional practices within the classroom in a constructivist approach (Howland, Jonassen, & Marra, 2011, pp. 3-5). In summary to clarification on how Moodle helps to provide positive conditions for constructivist learning, the information below categorizes the five attributes of meaningful learning by classroom activity.

Wikis, Glossaries and Active Learning

When using the Moodle LMS in the classroom, teachers are given the choice of having their students work collaboratively to create wikis and glossaries and in doing so, students can be seen as interacting with one another to produce authentic work while exploring new learning modalities and observing the results of their contributions. "Meaningful learning requires learners who are active—actively engaged by a meaningful task in which they manipulate objects and parameters of the environment they are working in and observing the results of their manipulations" (Howland,

Jonassen, & Marra, 2011, p. 3). When applying this to a LMS the Stony Brook University Division of Information Technology stated:

> Blogs, Wikis and Journals support active learning, collaboration and writing...They harness the power of the Web to be more interactive than traditional hardcopy papers and reports while engaging students. Students feel more motivated to contribute when they know that their peers can read and respond (Stony Brook University Division of Information Technology, 2008).

While wikis are also considered "outstanding tools for group work and other discussions" (Zsolt & István, 2008, p. 10), student-created glossaries within Moodle can be seen as collaboratively built encyclopedias. "A collaborative glossary can serve as a focal point for collaboration in a course. Each member of the class could be assigned to contribute a term, a definition, or comments on submitted definitions" (Cole & Foster, 2008, p. 141).

Intentional Learning through Moodle

According to the American Accounting Association, intentional learning "is learning with self-directed purpose, intending and choosing to learn and how and what to learn" (Accounting Education Change Commission, n.d., p. 1). "All experience, we assume, can have learning as an incidental outcome, but only some cognitive activity is carried out according to procedures that contain learning goals" (Bereiter & Scardamalia, 1989, p. 3). According to Souman Mandal in his thesis "Problem Based Learning Tool as a Plug-in for Moodle," the Moodle LMS can be set up as a self-directed learning environment where students learn the process of problem solving, by encountering, articulating and finding answers to real problems. Mandal's thesis explained a step-by-step process on how to create a problem-based learning (PBL) tool within Moodle where

students analyze the problem, choose the variable that should be investigated, search out the facts, and judge the correctness of their hypotheses and conclusions (Mandal, 2011).

As for goal-oriented learning, Moodle allows students to create their own personal e-portfolios allowing them to build a personal collection of their best work throughout the duration of the course. Moodle e-portfolios can be used within the blended learning classroom to provide opportunities for students to articulate their learning goals and monitor their progress towards achieving them (LCC International University, 2009).

Articulative, Reflective Learning through Journaling

One blended learning teaching strategy which can be used with the Moodle LMS is that of electronic journaling, or e-journaling. Journaling in general is a tool educators use to help "encourage learning and enhance self-reflection" (Dyer, 2009, p. 1). Journaling is a learning tool "meant to encourage reflection by forcing the student to write down his thoughts and reflections about a topic. The act of writing the journal entry encourages deeper reflection and more formal thought" (Cole, 2005, p. 127). E-journaling can be used as a way to assess student progress. "Using reflective journals as an assessment vehicle linked to Bloom's Taxonomy implements the patterns "Explain it Yourself", "Own Words", and "Expand the Known World" (Page, 2004, p. 2). By wording prompts wisely, students can respond at their capable level of cognition within Bloom's Taxonomy. In a handout distributed by the 2014 Southern Association of Colleges and Schools Commission on Colleges Summer Institute on Quality Enhancement and Accreditation, they describe Bloom's Taxonomy:

> Benjamin Bloom created a taxonomy of measurable verbs to help us describe and classify observable knowledge, skills, attitudes, behaviors and abilities. The

> theory is based upon the idea that there are levels of observable actions that indicate something is happening in the brain (cognitive activity.) By creating learning objectives using measurable verbs, you indicate explicitly what the student must do in order to demonstrate learning (Wheelan, 2014, p. 1)

By wording journal prompts using such measurable verbs from Bloom's Taxonomy, students may then respond at their capable level of cognition within the taxonomy. For instance, students mastering "material at the knowledge level will have the opportunity to demonstrate their knowledge of the subject matter, while students who have advanced to the analysis and synthesis levels will also be able to demonstrate their constructed knowledge and understanding" (Page, 2004, p. 17).

There are also opportunities for students to articulate their background, views, and interests and convey who they are within the Moodle LMS.

The user profile includes fields where participants can provide information about their background. Blogs allow people to express thoughts in a public but reflective way. Activity reports show all the contributions from a participant in a course. Log reports show detailed logs of every action taken by a participant in Moodle. The survey modules provide a variety of questionnaire tools (Zsolt & István, 2008, p. 10).

Cooperative, Collaborative, and Conversational Learning

In her paper "Moodle and Collaborative Learning in the ESL Classroom," Cecilia Ikeguchi, Ph.D explained Moodle helps to create a collaborative, cooperative learning environment where "students strengthen understanding of the concepts learned in class by engaging in several hands-on activities and by and exploring through online activities" (Ikeguchi, 2010, p. 4). Forums for instance are spaces that students can access to

collaborate in discussions on particular topics and share media and documents. "Forum activities can contribute significantly to successful communication and community building in an online environment" (California State University Northbridge Faculty Technology Center, n.d., p. 8). Furthermore, the database module within Moodle provides an instrument for collaborative development within the blended learning environment. Database activities within Moodle allow teachers and students "to build, display and search a bank of record entries about any conceivable topic. The format and structure of these entries can be almost unlimited; including images, files, URLs, numbers and text amongst other things" (California State University Northbridge Faculty Technology Center, n.d., p. 20).

Enhancing Two-Way, Teacher-Parent Communication

Many teachers know the importance of building strong teacher-parent partnerships in helping to support student learning. Effective communication is the key to building these strong partnerships. In her paper "Communicating with Parents: Strategies for Teachers," Susan Graham-Clay stated:

> Strong communication is fundamental to this partnership and to building a sense of community between home and school. In these changing times, teachers must continue to develop and expand their skills in order to maximize effective communication with parents (Graham-Clay, 2005, p. 1).

The American Federation of Teachers argued, "the manner in which schools communicate and interact with parents affects the extent and quality of parents' home involvement with their children's learning" (American Federation of Teachers, 2011, p. 4). A 2008 study shows that students perform better academically when consistent communication takes place between teachers and parents. Students of "involved parents

have a much greater chance to develop into healthy, knowledgeable, responsible, and caring adults" (Patrikakou, 2008, p. 1). Establishing these relationships "requires efforts from both teachers and parents to create a trusting, equitable relationship" (Canter, 1997, p. 1). In order to establish effective relationships, parents must make efforts to communicate with teachers. Supported by the U. S. Department of Education's Office of Elementary and Secondary Education, the Center on Innovation & Improvement claims "students whose parents stayed well informed and held high expectations for them had higher grades, completed more academic credits, and were more likely to plan for college" (Patrikakou, 2008, p. 2).

In order for parents to stay well informed, efforts to communicate must also be made on the part on the teacher. One-way communication and two-way communication are two main forms of parent-school communication. "Most school communications are one-way. They are intended to get the message out through newsletters, bulletins, and from letters" (Pawlaws & Meyers, 1989, p. 1). Other examples of one-way communication include: classroom and school newsletters, bulletins, media announcements, school-to-home notebooks and report cards. Most often, one-way communication involves teachers seeking "to inform parents about events, activities, or student progress through a variety of sources" (Graham-Clay, 2005, p. 118). "This kind of one-way communication, educators talking to parents, is insufficient, however. If children are to grow and learn and reach their full potential, parents and teachers need to work collaboratively, as a team" (Hoerr, 1995, p. 1). Therefore, two-way communication is said to involve interactive dialogue between teachers and parents (Nielsen, 2012). "The importance of establishing and maintaining meaningful, direct, two-way communication

between schools, parents and the community is one of the defining features of effective parent and community involvement" (National School Public Relations Association, 2006, p. 7). Two primary examples of two-way communication are face-to-face communication between parent and teacher or teacher-parent phone calls. Both are ways in which parents and teachers can for instance, communicate issues or to acknowledge student academic performance. However in this day and age, educators are beginning to see a shift in the evolution of two-way, parent-teacher communication.

In response to a survey conducted by the National School Public Relations Association (NSPRA), President Ron Koehler, stated "consumer needs are changing. The backpack folder is no longer the primary source of information for parents. They want and prefer instant electronic information" (Bagin, 2008, pp. 1-2). A recently-published study by the Australian Communications and Media Authority explained:

> Nearly three-quarters of parents use social media. Of these, 79 per cent access their main social networking site at least once a day, with 54 per cent reporting that they access their site several times a day. The majority of parents used Facebook (96 per cent of those using social media). These findings suggest that using social media to a greater degree is potentially a powerful way to reach parents...(Connected Parents in the Cybersafety Age June 2013 Snapshot, 2014, p. 28).

The rise in use of "web-based social networking tools is prompting many educators within organizations and institutions, including higher education, all over the world to consider how these tools can enhance online learning" (Baker & Edwards, 2011, p. 45).

Educators are finding education-specific, online tools useful when communicating with parents. Online tools such as Edmodo allow teachers to create a personal space and use it to connect with parents. Educators can "exchange messages and maintain open-communication with parents" (Edmodo, 2011, para. 1). Websites such as edublogs.org allow teachers and parents to participate in secure discussions within a secure blogging community (Edublogs, n.d.). The Moodle LMS also has an internal messaging and chat system which could also allow for private conversations between parents and teachers (Adelphi University, n.d.).

The Future of the Learning Management System Adopted by the Bethel Public School District

In Spring 2014, the Bethel Public School District approved a School Technology Levy that authorized,

> the district to collect $4.5 million over each of the next four years to pay for student technology and supporting infrastructure, across all grades K-12. Funds from the School Technology Levy can only be used for the purchase and support of technology, districtwide. (Bethel Public School District, 2014)

As a Bethel School District employee, I can substantiate that in the wake of the approved levy, during summer of 2014, the Bethel Public School District has plans to either continue using Moodle as an affordable LMS or to select a new LMS to implement into their blended learning courses.

State-Adopted, Core-Subject 7th Grade Learning Standards and the FIT Curriculum

As mentioned in Chapter 1, along with 42 other states, Washington State has adopted core-subject standards in support of the goal of graduating all students ready for

college, careers and life. With permission from the district and for the purposes of this project, such standards were purposefully integrated into the Bethel Public School District FIT curriculum at Liberty Middle School. This decision to include such standards with the FIT curriculum at Liberty Middle School was made by me in order to find whether or not the inclusion of such standards aided in improving students' core-subject, academic performance.

Technology Standards and the FIT Curriculum

Washington State has adopted educational technology standards. Such standards were included into the 7th grade FIT Framework as well as the 7th grade FIT curriculum for the 2013-2014 school year. Such technology standards were already integrated into the 7th grade FIT framework created by the Bethel School District.

Summary

This chapter had undertaken an analytical review of current academic performance trends within the State of Washington, blended learning models most prominent across k-12 schools and how the Moodle learning management system can be used to enhance constructivist learning.

With regards to overall, academic performance trends, average student academic performance and student growth in the state of Washington, it was noted that Liberty Middle School had recently been classified as having "good" student academic performance however "fair" student academic growth, indicating that teachers should set goals and targets for students, aligned to the statewide criteria to assure that each child reaches standard.

An in-depth description of "blended learning" was also provided and the process of selecting a suitable blended learning environment for the Liberty Middle School FIT class was likewise noted.

The Liberty Middle School FIT learning management system was described as one formally adopted by the Bethel School District as its primary learning management platform. Additionally, various examples were provided on how the selected LMS can be conducive to building a constructivist learning environment.

The importance of two-way communication between parents and educators as well as schools and their surrounding communities was also discussed relative to building strong connections and facilitating effective communication within the Liberty Middle School FIT class.

CHAPTER III

PROCEDURE

Introduction

Research was conducted on twenty-nine Liberty Middle School students exposed to the FIT Project in order to determine whether or not a blended learning environment that focuses mainly on incorporating core-subject standards into a current 7th grade Fundamentals of Information Technology (FIT) course can help to increase 7th grade student core-subject, academic performance.

Two data sets were collected. The first set of data involved students' grades in their core-subject classes before and after their exposure to the FIT project. The second set of data involved student's performance on teacher-created, FIT diagnostic pre-assessments and summative post-assessments corresponding to the teacher-created FIT lessons.

This chapter is divided into five sections. In the first, the purpose for the research was explained. The research method was then described. A context of the studies was then provided and a research hypothesis specified. The fifth section described the data sets that were collected for purposes of analytical review.

Academic Performance within the Bethel Public School District

For the purposes of this project, the 2013 Washington State Achievement Index has been used as a way to label the current academic performance of Liberty Middle School students. In order to adequately site the Washington State Achievement Index, one must have a general idea of the current, legislative laws regarding the topic. The

Washington State Achievement Index is a joint project between the State Board of Education (SBE) and the Office of the Superintendent of Public Instruction (OSPI).

Purpose

The purpose of this project was to determine whether or not a blended learning environment which focuses mainly on incorporating core-subject standards into a current 7th grade FIT course can help to increase 7th grade student core-subject, academic performance.

Research Method

A quasi-experimental research design was used to investigate the variables identified in the following exploratory research question:

> Can the use of the Station-Rotation blended learning environment combined with the use of the Moodle LMS and the inclusion of core-subject standards and Washington State Educational Technology standards and Career and Technical Education (CTE) Program Standards into the current technology curriculum affect student academic performance in core-subject grades?

Context of the Studies Regarding the "FIT Project"

According to a published report regarding blended learning and Greeley-Evans School District 6, blended learning has transformed the classroom experience and is revered as "the transformative educational innovation of our time and has the potential to significantly improve K-12 education throughout the country" (Andrews & Datteri, 2014, p. 2). However, "increased access to technology alone will not fundamentally transform education" (Moller, Harvey, & Huett, 2009, p. vi). Effective use of online learning strategies must take place in these blended learning environments in order to enhance the

educational options for students and districts to meet their academic achievement goals. The Moodle LMS was created to assist teachers in incorporating such important learning strategies into their blended learning classrooms. Several issued reports show the success of blended learning environments—specifically those with LMS's, used in every day instruction to enhance learning (Apple, Inc., 2013). In this project, together the use of the station-rotation blended learning environment and the Moodle LMS will cover the "how" in "how the content will be taught" and together the core-subject standards, Washington State Educational Technology standards and Career and Technical Education (CTE) Program Standards will cover the "what" in "what content will be taught." The core-subject standards "provide a clear and focused progression of learning from kindergarten to graduation that will provide teachers, administrators, parents and students with the information they need for student success (Achieve, Inc., 2010, p. 1). CTE and CCSS have the goal of college and career readiness," while CTE provides "the context for the learning described in the CCSS" (Oregon Department of Education, 2014). Thus, this project explores the effects (if any) of fostering such a learning environment with aims to increase and enhance communication between students, parents and the teacher, and to ultimately support students, the district and the community in becoming a part of the state-wide, positive change in student academic performance. Henceforth, said project will be coined the "FIT Project."

Research Hypothesis

Students exposed to the "FIT Project" (a.k.a. the station-rotation blended learning environment coupled with the use of the Moodle LMS while incorporating core-subject standards into a pre-existing technology curriculum), will demonstrate increased student

academic achievement as seen through the results of diagnostic assessments and grades in core-subject classes.

Data Collection

Data Collection Set One

Data collected throughout the period of one trimester from Educator Access Plus provided for a statistical analysis of students' grades in their core-subject classes. Educator Access+ (EA+) is an online tool designed to enhance teachers' access to student information (Washington School Information Processing Cooperative, 2014). The educators of the Bethel Public School District use EA+ to manage their class gradebook, attendance, and scheduling of daily activities. This program also blends GradeBook, Teacher Access, Special Education, Administrator Access, Advisor Access, and Extracurricular Activities into one online portal. Using Educator Access, grades in core-subject classes of the 7th grade FIT students of Liberty Middle School were collected one day prior to the students' enrollment in the trimester-long FIT course. Grades in the same core-subject classes by the same students were collected at the end of the trimester. A rate was generated using the data collected, to provide a descriptive comparison of students' core-subject grades and their use of and exposure to the FIT project.

Data Collection Set Two

This second set of data was collected throughout the period of one trimester using teacher-created, diagnostic pre-assessments and summative post-assessments which corresponded to the teacher-created lessons, assessed student learning outcomes and provided for a statistical analysis of students' understanding of various grade-level, core-subject concepts. The pre- and post-assessments provided a method for measuring the

"value added" by the FIT project. Specifically, a rate was generated using the data collected from the pre- and post-assessments which were used to provide a descriptive comparison between students' learning outcomes, retention of core-subject concepts and their use of and exposure to the FIT project.

Pre- and Post-Assessments

As mentioned in chapter one, a pre-assessment was administered to all students at the "entry point" of each unit within the FIT project. Additionally, a post-assessment was administered to all students at the "exit point" of each unit within the FIT project. Each curriculum unit within the FIT project was associated with its own unique pre- and post-assessment. Each pre- and post-assessment was also, specifically designed for the purposes of the FIT project. For example, "Unit 1: Pretest," was comprised of different test questions when compared to "Unit 2: Pretest." However, the pre- and post-assessments associated with one particular unit were identical. For example, the test questions on the "Unit 1: Pretest" are identical to the questions on the "Unit 1: Posttest."

Reasoning Behind Administering Pre and Posttests

Each unit pre-assessment (as well as its corresponding, identical post-assessment) was created specifically for the purposes of the FIT project to provide for a statistical analysis of students' retention of various grade-level, core-subject concepts integrated within each unit of the FIT project.

Subjects

Students were automatically enrolled in the FIT course as part of the school's exploratory track. Exploratory and enrichment experiences are fundamental components of the Liberty Middle School elective option which offers students the opportunity to

enroll in three of the following courses throughout the school year: Health and Fitness, Robotics, Fundamentals of Technology, Art and Music or Band/Choir/Orchestra (Bethel Public School District, 2013, p. 2).

The study was conducted using a convenience sample of 29 students enrolled in one trimester (March to June 2014) of the FIT course offered through Liberty Middle School of the Bethel Public School District. The sample was comprised of all 7th grade students enrolled in the FIT course during the spring trimester, with five of the twenty-nine (or seventeen percent) students classified as having individualized education plans addressing their needs.

Application of One-Group Pre- and Post-Assessment Design Analyses

I preformed the investigation of student success in core-subjects through use of a blended learning environment and self-created curriculum. The Station-Rotation blended learning environment included the use of a LMS built upon the Moodle Framework. Data was obtained from Educator Access Plus (EA+), Office of Superintendent of Public Instruction (OSPI), and pre and post unit assessments.

Configuration of the Pre and Post Assessments

As mentioned in Chapter I, the FIT Framework was comprised of six units throughout the period of one trimester. The FIT project was created using the FIT Framework as a guide and each of the six units within the project had an associated pre- and post-assessment. On the day prior to the introduction of each unit within the FIT project, students were required to take a pre-assessment for that unit. For the purposes of this project, such day is identified as the "entry point." Furthermore, on the day after the completion of a unit, students were required to take a post-assessment for that unit,

comprised of the same questions on the unit's pre-assessment. For the purposes of this project, such day is identified as the "exit point." The pre-assessments were created to provide for a statistical analysis of students' retention of various grade-level, core-subject concepts integrated within each unit of the FIT project and assess students' knowledge in four subject areas: 7th grade Mathematics, 7th grade Humanities, 7th grade Science and 7th grade Technology. Each pre- and post-assessment was comprised of sixty test questions: fifteen English Language Arts questions, fifteen History questions, fifteen Mathematics questions and fifteen Technology questions.

Test Questions

Test questions were created using the professional resources cited below and each pre- and post-assessment contained a variety of questions (multiple choice, true/false, fill-in-the-blank, etc.) which were written in a way to assist in peaking the students' interests in learning the material being taught.

Humanities and Mathematics Core-Subject Test Questions

Each pre and post-assessment included fifteen Humanities and fifteen Mathematics questions, for a total of thirty core-subject-related test questions. Thus, fifty percent of the test questions on each pre and post assessment were directly related to the core-subject standards adopted by Washington State. The Humanities and Mathematics questions associated with a particular pre- and post-assessment were written to be aligned with specific, 7^{th} grade, core-subject standards. For example, at the entry point of a unit, students completed a pre assessment which contained questions associated with specific core-subject concepts. Students were then taught the unit which exposed them to learning those specific concepts. Once the unit was complete, all students completed the post-

assessment in order to determine whether they had retained the concepts they were exposed to within that particular unit.

Humanities and Mathematics assessment questions were written using the Smarter-Balanced "Practice Test Scoring Guide for Grade 7 Mathematics" and "Practice Test Scoring Guide for Grade 7 English Language Arts" as guides (Smarter Balanced Assessment Consortium, 2013). Additionally, the Common Core State Standards Initiative was also used as a guide for generating test questions (Common Core State Standards Initiative, 2014).

"Next Generation" Science Test Questions

Each diagnostic pre- and summative post-assessment also included fifteen Science questions. Fifteen Science questions included in each pre and post-assessment were written to be aligned with the specific Washington State adopted, Next Generation Science Standards (NGSS). The Science questions on a given unit's pre- and post-assessment were taught within the unit associated with that pre- and post-assessment. Science assessment questions were written using the "Washington State K-12 Science Learning Standards" as a guide.

Educational Technology Test Questions

Each pre and post-assessment included fifteen Educational Technology questions; however, the results of the technology-related test questions did not apply to what was being studied for the FIT Project and were not included in this report. The results of the technology questions were used for curriculum diagnostic and FIT student grading purposes. However, it should be mentioned that Technology assessment questions were

written using the Washington State "Educational Technology Standards" and "Career and Technical Education (CTE) Program Standards" as guides.

Handling of the Assessment Answers

In order to more accurately determine a rate of success, once students had completed particular pre-assessment, students were not given the answers to that pre-assessment. However, at the exit point of a unit and the completion of the associated post-assessment, students were provided the answers to the identical pre and post-assessments associated with that completed unit.

Administration of the Assessments

At the entry point of each unit, all students were provided a paper-based, 60-question, diagnostic pre-assessment. Students were asked to complete the assessment within that single class period. All incomplete assessment questions were marked as "incorrect." Students absent on the day the pre-assessment was administered had to complete the assessment in the back of the classroom, while instruction was taking place. The pre-assessment was due by the end of the class period on the day the student arrived back to class. Results of the pre-assessments were collected the same day the pre-assessment was administered and were kept from students until the completion of the unit.

Students were allowed to use a calculator on both the pre- and post-assessments. However, the only calculator students were allowed to use was the one provided to them through the Moodle interface.

While the pre- and post-assessments were given, the teacher and teacher's assistant acted only as "proctors" supervising examination, maintaining discipline, and a quiet classroom atmosphere.

Upon completion of the exam, students were asked to raise their hands for their paper test to be collected and were then given a paper-based assignment to quietly work on for the rest of the duration of class.

Each student was provided with identical pre- and post-assessments. Students identified as special needs were allowed two full class periods to complete their assessment. Additionally at least two days prior to examination, the advisors of students who were classified as special needs were provided at least two days' notice of the assessment taking place.

Summary

The purpose of this chapter was to represent the philosophical assumption that underpinned the research. A specific research method was used in order to collate and evaluate the data in accordance to the goal of determining whether or not a blended learning environment that focuses mainly on incorporating core-subject standards into a current 7th grade Fundamentals of Information Technology (FIT) course can help to increase 7th grade student core-subject, academic performance.

The respondents of the study were twenty-nine students exposed to the FIT project. The instruments used for the study were students' grades in their core-subject classes before and after their exposure to the FIT project and FIT diagnostic pre-assessments and summative post-assessments corresponding to the teacher-created FIT lessons.

CHAPTER IV

THE PROJECT

This project was developed for 7th grade Fundamentals of Information Technology (FIT) course, students and parents within the Bethel School District to determine if it assisted in the increase of 7th grade student core-subject, academic performance. Such performance may be discernible. The curriculum materials within this project may be used for curriculum development within the Bethel School District 7th grade FIT program.

Highlights of the

FUNDAMENTALS OF INFORMATION TECHNOLOGY PROJECT

An Online Curriculum Guide written for Middle School Technology Teachers of the Bethel School District.

By
Courtney Lynn Curtis

2014

TABLE OF CONTENTS

INTRODUCTION

The following are highlights of the "Fundamentals of Information Technology Project"-an online technology curriculum guide for middle school Information Technology Teachers. Highlights of the FIT Project are presented below and demonstrate how the project is arranged. Though the online curriculum guide is written to accommodate employees of the Bethel Public School District, technology educators from outside of the district may find parts of the guide useful when developing their own curriculum. The online FIT Project contains all original work and was developed as a project by technology educator, web developer and curriculum writer Courtney Curtis.

Curtis (2014) indicated that:

> When entering the website, the top of the page displays an overview of the results of the two studies which have led to the guide's creation. The published guide is divided into six teachable units. Each unit contains: lesson plans and instructional materials, materials for measuring student learning, materials for connecting teachers with parents, and materials for connecting students with the community. (2014)

Below is a list of what educators will find within the FIT Project curriculum Guide:

1. Intro to the Project
2. Vocabulary Used in the F.I.T. Guide
3. F.I.T. Student Vocabulary List
4. Curriculum Unit Resources
    a. Instructional materials
    b. Measuring Student Learning
        i. Homework
        ii. Project Based-Learning and Assessments
        iii. Lesson Rubrics Used for Grading
        iv. Pre and Post Unit Assessments
        v. Tech Quizzes based on Tech Standards
        vi. Additional Activities and Extra Credit
5. Reaching All Learners
6. Connecting with Parents
7. Connecting Students with Tech Career Pathways and their Local Community
8. Student Ownership of Their own Education
9. Helpful Links and Reproducibles

About the Author of the FIT Project

Courtney had earned her Bachelor's degree in Education from California State University, Chico and is pursuing Master degree of Education in School Administration from Central Washington University. She has credentials to teach elementary grades in both Washington State and California. Additionally, Courtney is certified to teach Career and Technical education courses in Information and Communication Technology and Arts, Media and Entertainment.

Courtney Curtis has acquired a great deal of experience working in the education field over the past thirteen years; from 2001, working as an in-class and after school program k-12 tutor to her current position as middle school technology teacher.

Her professional career does not stop at teaching. While teaching in California, she played an integral part in supporting and training both certificated and classified staff on various district-implemented software and systems products such as Drupal, Moodle, Adobe products and live video recording products.

While teaching Multimedia Design I and II and Photo Restoration for the Oroville High School District (OHSD), she trained the OHSD staff on ways in which to integrate Moodle (an open-source learning management system) and other digital technologies into their new blended learning courses. She provided instructional support and digital integration strategies through research, practice and demonstration.

Additionally, over the years Courtney has utilized the open-source Drupal framework to create dynamic websites for schools and districts. After creating Oroville Adult School's official website which was based on the Drupal Content Management System, she began teaching OHSD staff members ways in which to utilize the Oroville Adult School (OAE) website and how to update the OAE website via Drupal modules, views and nodes.

In 2010, while teaching 9-12th grade technology courses (Web Design, Animation, Video Production and Computer Applications) for the East Nicolaus High School District, she played an integral part in the development and integration of technology at building and district levels. Much of her input was geared towards developing their high school "Technology Pathway."

In 2011, Courtney was picked out of just a handful of CTE educators and hired as a CTE Online specialist to write quality, licensed curricula for CTEonline.org. CTEonline.org is an educational website established to assist California educators in accessing licensed, digital, standards-based, Career and Technical Education resources and lessons. Courtney enjoys her continued work with CTEonline.org.

Additionally, Courtney an Adobe Certified Expert in Adobe Dreamweaver, Photoshop and Flash and a Microsoft Office Specialist in Microsoft Word, PowerPoint and Excel.

Currently, Courtney enjoys teaching 7th grade Information Technology in the Tacoma, Pierce County area and is a new member of CoderDojo, a popular global network dedicated to teaching computer programming to our nation's youth.

Summary of the Guide

The FIT curriculum guide is written specifically for technology educators who teach in a blended learning environment. The guide is assembled heavily around the constructivist learning theory. The constructivist theory "describes human learning as an active attempt to construct meaning in the world around us" (Conrad, 2011, para. 2). The FIT Project curriculum guide uses emerging perspectives on learning, teaching, and technology such as Bloom's Digital taxonomy (Bloom's Digital Taxonomy Map, 2014), Vygotsky's Zone of Proximal Development and scaffolding (Lui, 2012), Howard Gardner's theory of Multiple Intelligences (Northern Illinois University, n.d.), Clayton Christensen's research on blended learning environments (Horn & Staker, 2011) and Martin Dougiama's Moodle Course Management System (Cole & Foster, 2008). Additionally, each unit within the guide is aligned the following set of standards: Career and Technical Education, International Society for Technology in Education, Washington State Technology Standard, and Washington State Information Technology Career Cluster. Each unit is also aligned with core-subject standards such as: core English standards, core Mathematics standards, Washington State History standards and Next Generation Science and standards.

Data Analysis

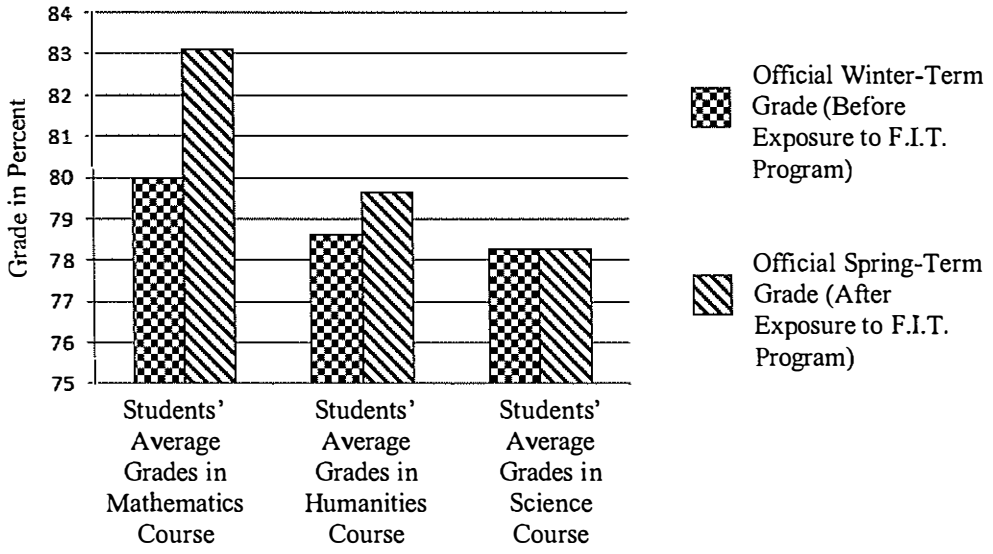
The FIT Project was developed from of a study of twenty-nine 7th grade students enrolled in the FIT course. Throughout the course of a trimester, students participated in pre and post unit assessments assessing their knowledge of 7th grade core-subject concepts. Though the results are not conclusive, a comparison of student report card

grades in core classes, pre- and post-exposure to the FIT project displayed positive results.

Data Collection Set One indicates an overall change. As the chart indicates the students' overall Mathematics grades increased between the winter and spring report card periods. Prior to the student's enrollment in the FIT course, their combined Mathematics grade was 80.00%. After the period which students were exposed to the FIT curriculum, students' Mathematics grades increased by 3.10%. Students' overall Humanities grades increased between the winter and spring report card periods. Prior to the student's enrollment in the FIT course, their combined Humanities grade was 78.62%.

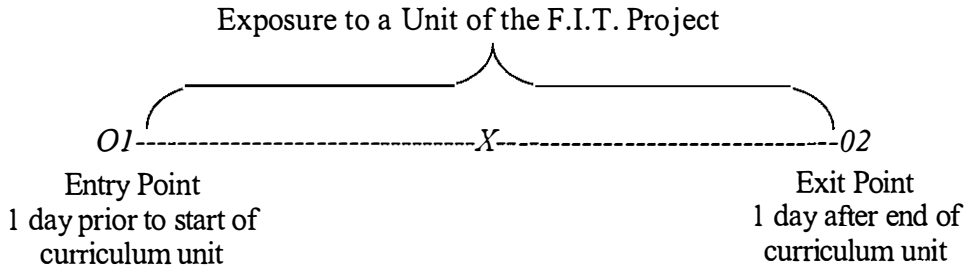
After the period which students were exposed to the FIT curriculum, students' Humanities grades increased by 1.03%. Lastly, students' overall Science grades remained the same between the winter and spring report card periods. Prior to the student's enrollment in the FIT course, their combined Science grade was 78.28%.

Comparison of Student Report Card Grades in Core-Subject Classes, Pre- and Post-Exposure to F.I.T. Project

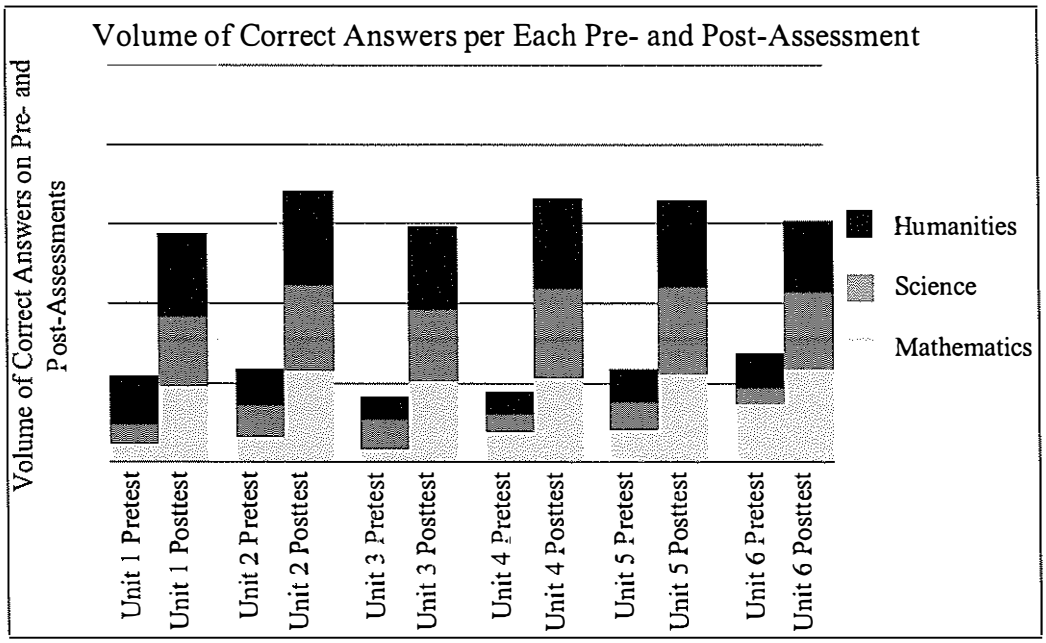


After the period that students were exposed to the FIT curriculum, students' Science grades remained at 78.28% and had not increased or decreased.

Data Collection Set Two utilized a One-Group Pretest-Posttest Design. For example, in the case of each of the pre- and post-assessments administered, the entry point specified the students' knowledge of core-subject concepts prior to the student's exposure to a unit of the FIT project. X was the introduction of the FIT unit with the utilization of the Station-Rotation blended learning environment and the Moodle LMS, and Period O2 is classified as the exit point which indicated students' knowledge of core-subject concepts after exposure to the FIT unit. The pretests provided some information as to what student's core academic performance might have been, had the intervention not occurred.



Data collection Set Two indicates that throughout the period of one trimester, students' understanding of various grade-level, core-subject concepts had increased following the periods students were exposed to units of the FIT project.



Specifically, change in percent of core concepts known using the data collected from the diagnostic pre- and summative post-assessments can be seen below. For instance from the data below, we see that students exhibited over three times the amount of understanding of unit 5 science standards after unit 5 was taught. Such change may indicate a positive correlation between students' learning outcomes, retention of core concepts and their use of and exposure to the FIT project.

Percent Difference Between Correctly Answered Test Questions Between Exit Point and Entry Point of Unit

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Humanities	+575%	+481%	+767%	+389%	+343%	+159%
Science	+483%	+438%	+656%	+384%	+338%	+170%
Mathematics	+517%	+475%	+744%	+368%	+348%	+208%

The results of the studies indicate that the FIT Project may have helped to increase students' official core-subject grades as well as to help students retain various grade-level core-subject standards.

The Importance of Incorporating Core-Subject Standards into Middle School Technology Courses

Why core-subject standards in a CTE course? To date, forty-three states have aligned their education systems with the Common Core State Standards (CCSS) in support of the goal of graduating all students ready for college, careers and life (Common Core State Standards Initiative, 2014).

> Academic and career and technical education (CTE) leaders at the state and local levels can and should maximize this opportunity to finally break down the silos between their disciplines and collectively find ways to ensure that the new standards rigorously engage all students in both academic and CTE courses" (Meeder & Suddreth, 2012, p. 3). Today, 46 states and Washington, DC, are engaged in implementation of the new Common Core State Standards (CCSS), which affects instructional materials, curricula, professional development and assessment. The CCSS identify the knowledge and skills students need at each grade level, providing potential opportunities for CTE educators to share their expertise around project-based learning and the application of content to their colleagues in mathematics, English and other affected disciplines (p. 4).

Moodle

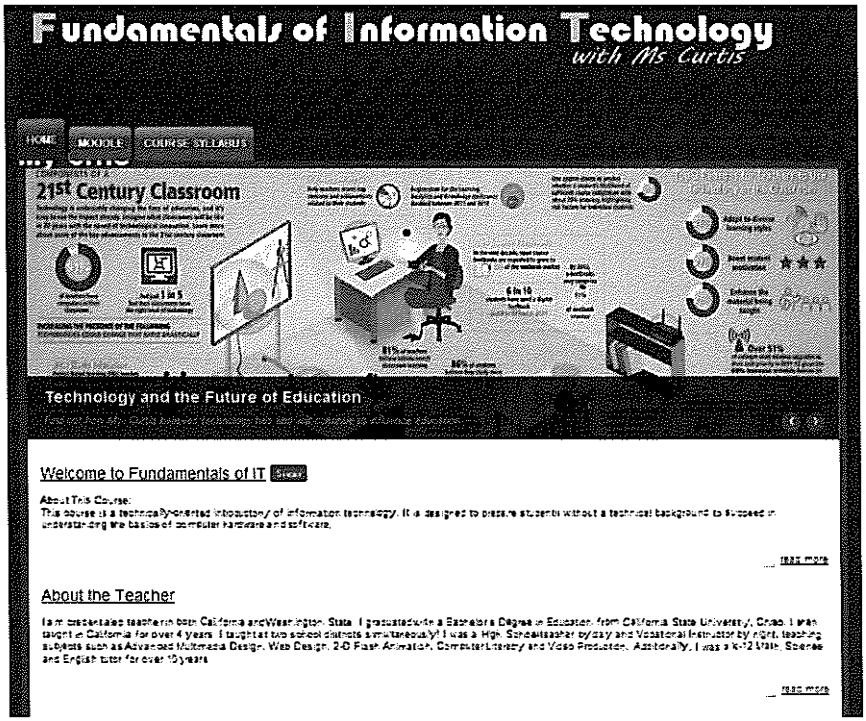
The FIT Curriculum Guide was built using the popular, Modular Object-Oriented Dynamic Learning Environment (Moodle) platform. Moodle is an Open Source LMS that was originally "designed as a guide for developing constructivist learning environments" (Antonenko, Toy, & Niederhauser, 2004, p. 2). Moodle was created by Martin Dougiamas, a former WebCT system administrator, in response to his frustrations with what he believed to be numerous inadequacies with commercial, proprietary LMS's such as Blackboard and WebCT (Ahern, 2010). Dougiamas explained how Blackboard and WebCT "lack flexibility in designing and in adding customized learning modules" (Antonenko, Toy, & Niederhauser, 2004, p. 2).

> Current advances in open source online learning environments are a response to the shortcomings of commercial products like WebCT and Blackboard. One such weakness is a lack of flexibility in designing and adding customized learning modules. With commercial products one can only include elements that the software designers deemed necessary when they developed the program. (Antonenko, Toy, & Niederhauser, 2004, p. 1)

For the teacher, "Moodle offers a platform where the constructivist approach can be implemented and extended to include social interaction. Its features include tools supporting interactive activities such as assessment tasks, discussion forums, chat rooms, journals, quizzes, glossaries, and wikipedias" (Petrova, 2005, p. 19).

The FIT Guide Online

In order to view the FIT Guide online, one must first be given account access. The first set of images below exhibits the website, how to ask for account access and how to navigate to the curriculum materials. When accessing the course website, you will be greeted by an initial home page. The home page provides educators two purposes: How to navigate to curriculum materials and an example of what a typical Classroom website might look like.



Notice the home page contains a digital copy of the course syllabus, an article introducing the course itself and an article describing the course teacher.

From the home page, educators may access the curriculum guide by selecting the "Moodle" button displayed at the top of the page.

On the next screen, educators will be greeted with the summary page to the FIT Curriculum Guide. To log in as a guest, educators must email Courtney Curtis directly with a request for guest access. Courtney may be reached at: CommonCoreAndCTE@gmail.com

Unit Descriptions within the FIT Project

The following seven images display the "FIT Project Unit 1 Lesson Descriptions" and curriculum materials. The Unit 1 lesson descriptions below paint a picture of the format and structure of the curriculum that was created for the FIT project and convey the importance of including core-subject standards within a 7th grade Career and Technical Education course.

Each performance-based task listed the section titled "Performance Tasks" is aligned explicitly with a 7th grade Washington State-adopted education standard. All objectives listed within a unit of the FIT project are displayed in rubrics as performance-based tasks.

All lesson plans and lesson descriptions listed below are original works by Courtney Lynn Curtis with permission for the Bethel Public School District to access, distribute and modify beginning December 01, 2014.

UNIT 1: INTRODUCTION TO INFORMATION TECHNOLOGY

Leadership: N/A for this unit.

Total Learning Hours for Unit: 10

UNIT ASSESSMENT EVIDENCE

Performance Tasks as listed below
Other Evidence: Pre and post unit assessments

DESIRED RESULTS
Using Bloom's Taxonomy and Digital Pedagogy Wheel

Performance Tasks

Through:

- Composing a clear, coherent, three-paragraph, handwritten letter
- Drawing evidence from informational text
- Citing several pieces of textual evidence
- Demonstrating a clear understanding of technology systems and operations
- Preparing for reflection and discussion on an article
- Identifying and defining authentic problems and significant questions for investigation
- Preparing for the collaborative discussion on an article
- Producing a unique and original advertisement
- Applying specific note-taking skills
- Illustrating by drawing
- Applying properties of operations as strategies
- Producing a digital storyboard
- Examining a role-play activity
- Collaborating with others and supporting peers
- Describing visually "systems" as small units of investigation
- Participating in collaborative group work and discussions
- Posing questions that elicit elaboration and responding to others' questions and comments with relevant observations and ideas
- Incorporating multimedia components and visual displays in presentations
- Identifying and defining authentic problems and significant questions for investigation
- Examining the interdependence of Science and technology

Students Will Be Able to:

- Describe themselves and reflect upon who they are and what knowledge they bring to class.
- Create a research question and use it to guide inquiry on an issue.
- Support analysis of text within an article explicitly as well as develop inferences drawn from the text.
- Practice safe, legal and ethical behavior.
- Refer to evidence supported in an article.
- Plan strategies to guide inquiry.
- Hypothesize issues of supply and demand related to the current economy and market trends.
- Highlight the functions of a single hardware product.
- Summarize key points in a lecture.
- Illustrate by drawing the process of heat conduction, specifically illustrating the flow of heat.
- Illustrate by drawing the flow of energy from one system to another and illustrate how the output of one system can become the input of another system.
- Add and subtract rational numbers. (2x2x2) + (2x2) + (2) + (1) = 15
- Create original work for group expression.
- Produce a unique, digital storyboard
- Contribute to the learning of others.
- Compare small systems to larger, much more complex systems such as our world.
- Create a "How To" guide, building on others' ideas and expressing their own clearly.
- Generate ideas and create original digital works for group expression.
- Communicate in groups using digital media to support individual learning and contribute to the learning of others.
- Demonstrate a clear understanding of wikis and practice safe, legal and ethical behavior.
- Focus the discussion back on a topic as needed.
- Report findings on a specific topic.
- Guide inquiry.
- Explain how Science drives technology by demanding better instruments and suggesting ideas for new designs and Technology drives science by providing instruments and research methods.

First Day Introductions	**Duration:** 55 min

Description: Day 1: Students walk in sit down. At their desks is a copy of a handwritten letter written by their teacher, about their teacher. Students are asked to read the letter and for homework, write the teacher a 3+ paragraph hand-written, friendly letter in response describing themselves, their relationship with technology and what they would like to gain out of the class. Teacher explains to students that letters will not be shared or discussed in class by the teacher. The purpose of assigning the friendly letter assignment is for the teacher to gain a better understanding of his/her classroom dynamics in order to tailor lessons to meet the needs of the class. Students are then provided a rubric which defines the evaluation and score of the "handwritten, friendly letter" assignment. Students are also provided a template illustrating the format of a friendly letter. After students read the teacher's letter, the course syllabus is distributed. Teacher provides introduction to class. Moodle passwords/usernames are then distributed and students log in to Moodle to take the "Multiple Intelligences Quiz", "VARK Learning Preferences Inventory" and "Myers-Briggs Personality Quiz". Once quizzes are complete, students write the following the information gathered from the quizzes onto a 3x5in index card located on their desk: name, hobbies and the results of their the "Multiple Intelligences Quiz", "VARK Learning Preferences Inventory" and "Myers-Briggs Personality Quiz." Students are told that the information on the card will be used to create "playing cards" of each student. These "playing cards" are to be used when grouping students, calling on students, etc.
Exit ticket: At the end of the period, index cards are collected and homework discussed.

Homework: Parents/students signed syllabi and hand-written letter to teacher

Notes to educator: Type each of the students 'index cards on to a template using
http://www.readwritethink.org/files/resources/interactives/trading_cards_2
Print cards students' card on cardstock paper (print 2 copies of each card). These cards are to be used when grouping students, calling on students, etc.

Objectives:

- Students will be able to compose a clear, coherent, three-paragraph, handwritten letter describing who they are.

Aligned Washington State Standards:
English Language Arts:

- CCSS.ELA-LITERACY.WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

Lesson 1: The History Of Personal Computing	Duration: 135min

Description: Day 2: Review classroom rules, Explanation of Unit 1 given, students take Unit 1 Pre-assessment.

Exit ticket: Pre-assessment turned into teacher before leaving class

Day 3: Proper use of Moodle forums is explained. Refer to the students' signed syllabi acknowledging their understanding of expected, virtual classroom behavior. Explain the lesson for today→"History of Personal Computing Scavenger Hunt". Teacher demonstrates the online application, "Thinglink" then reviews the rubric for the " History of Personal Computing Scavenger Hunt" (due by the end of the period). Students log into Moodle to access their "Thinglink" accounts and contribute to and collaborate on one digital "Thinglink" by searching for pictures and text that briefly describe landmark events regarding the history of personal computing (dates must be included in each of their contributions). During their internet scavenger hunt, they paste the information they find into the whole-class "Thinglink" presentation.

Exit Ticket: Each student must contribute at least 2 links with an associated image for each and must also identify the links with his/her name.

Homework: Students are asked to take home and read an article titled "History of the Personal Computer Market." The article is written on the topic of supply and demand of personal computers. Questions are provided at the bottom of the article which relate to the concept of supply and demand. Students must answer each question. Students must also develop at least one research question based on the article. Their research question must be written to guide inquiry regarding either the demand and supply of personal computers or the demand and supply of smartphones. Students are not required to know the answer to their own research question but should have a basic understanding of the answers to the other questions listed below the article. Students must complete the "History of the Personal Computer Market" homework assignment and bring it to class on the next school day.

Description: Day 4 (Part 1): as students enter the classroom, they are greeted with various tangible items (coffee maker, calculator, wrist watch, cell phone, remote control, battery-operated clock, etc.) displayed on a table in classroom. A sign posted above the items on the table reads "Which of these are Computers? Which are not?" Students are asked to use sticky-notes found on their desks to write their names on. They then are asked to place one sticky note on (or next to) each tangible item on the table. A blue sticky note indicates that the student believe an item is not a computer. A yellow sticky note indicates that a student believes an item is a computer. Teacher then engages the whole class in a discussion and reviews what are/are not computers and the reasons why.

Notes to educator: Understand how to use Thinglink prior to the class session. Set up student Thinglink accounts, either on the first day or prior to the first day of class (emails aren't necessary upon sign-up).

Objectives:

- Students will be able draw evidence from informational text to create a research question and use it to guide inquiry on an issue.
- Students will be able to cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- Students will be able to demonstrate a clear understanding of technology systems and operations and practice safe, legal and ethical behavior.

Aligned Washington State Standards:

Social Studies

- Social Studies Skills 5.2.1 Creates and uses research questions to guide inquiry on an issue or event.

English Language Arts:

- CCSS.ELA-LITERACY.WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.
- CCSS.ELA-LITERACY.WHST.6-8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- CCSS.ELA-LITERACY.RI.7.1 Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Educational Technology:

- EALR 2 – DIGITAL CITIZENSHIP Students demonstrate a clear understanding of technology systems and operations and practice safe, legal and ethical behavior

Lesson 2: The Building Blocks Of A Computer	Duration: 135min

Description: Day 4 (Part 2): Teacher reviews the "History of Personal Computing Scavenger Hunt" Thinglink collaboration project in front of class (also reviewing any incorrect Thinglink contributions). Teacher then explains the class will participate in a fishbowl discussion and explains the concept of a fishbowl discussion. The teacher then explains how participation points are awarded during a fishbowl discussion. Students then engage in a fishbowl seminar-style, deep discussion regarding the article on supply and demand. During the discussion, students are randomly called upon to read their supply/demand homework question to class. Students must also be prepared to comment on someone else' responses. Next, the teacher then explains the assignment "Building Blocks Of A Computer Advertisement Contest" and its associated rubric which defines the evaluation and scoring criteria of the assignment. Students are then grouped into 9 groups (3-4 students per group). Students then begin working on the "Building Blocks Of A Computer Advertisement Contest." To begin, each group randomly draws an 8.5x11in sheet of paper from the teacher. Printed on the back of the of paper is a computer component (motherboard, Ethernet cable, CPU, graphics card, RAM, power supply, hard drive, optical drive, sound card) . Each group is also provided a blank 8.5x11in piece of paper.

Exit Ticket: Each group must write a list of their group member's first and last names on the blank piece of paper and write the name of the computer component they think they were given. Groups then hand the teacher both the picture of their computer component as well as the list of their group-member's names.

Day 5: Students form into their groups and teacher hands back to the groups, the picture of their computer component. The teacher then has students log into Moodle and access https://magic.piktochart.com. For the rest of the duration of class, groups work to create an advertisement, advertising their computer component. Their advertisement must be computer-generated contain a graphic of their computer component, explain in one sentence what their component does and have a catchy slogan. Other requirements are listed on the assignment rubric. In order to be awarded full points, groups must know what their computer component is and does (these requirements are specified on the rubric).

Exit Ticket: Completed poster advertisements turned in by the end of the period.

Day 6: Advertisements are displayed on walls prior to students entering the room. Class begins with the teacher describing good note-taking strategies and Cornell note-taking. Students are then told to log into Moodle where they access a blank Cornell Note template from http://www.easel.ly to type notes onto. Students are also handed a rubric titled "Cornell Notes Assignment." The teacher explains the 9 computer components that were assigned during the poster contest assignment (motherboard, Ethernet cable, CPU, graphics card, RAM, power supply, hard drive, optical drive, sound card) describing each component and its function while students take notes Cornell style. Included in the lecture are two Science-related foci. "The heat (thermal energy) flowing from the CPU is extremely hot. The CPU is the hottest component inside of the computer. A "heat sink" is a device connected to the CPU to allow the heat to travel to it. Heat then travels to this cooler object until both reach the same temperature." The teacher then displays a heat sink and a CPU and has students illustrate in a drawing the function of a heat sink, specifically showing the flow of heat. The teacher also explains input and output devices (such as keyboard, mouse, speakers, monitor, and printer) and how the output of one system can become the input of another system. Students then must illustrate in a drawing the flow of energy from one system to another displaying how the output of one system can become the input of another system.

Exit Ticket: Cornell notes handed in to the teacher
Notes to educator: You will need to pre-create a Cornell notes template in the popular application: http://www.easel.ly. Provide students with examples of each assignment.

Objectives:

- Students will be able to prepare for reflection and discussion on an article, drawing on that preparation by referring to evidence supported in the article.
- Students will be able to identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry.
- Students will be able to prepare to share and explain their hypothesis regarding issues of supply and demand related to our current economy and the PC market.
- Students will be able to produce unique and original advertisements highlighting the functions a single hardware product.
- Students will be able to apply specific note-taking skills to summarize key points in a lecture.
- Students will be able to illustrate in a drawing the function of a heat sink, specifically showing the flow of heat.
- Students will be able to illustrate in a drawing the flow of energy from one system to another and how the output of one system can become the input of another system.

Aligned Washington State Standards:
English Language Arts:

- CCSS.ELA-LITERACY.SL.7.1.A Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
- CCSS.ELA-LITERACY.SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
- CCSS.ELA-LITERACY.SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

Science:

- Physical Science 6-8 PS3B Heat (thermal energy) flows from warmer to cooler objects until both reach the same temperature. Conduction, radiation, and convection, or mechanical mixing, are means of energy transfer.
- Systems 6-8 SYSC The output of one system can become the input of another system.

Lesson 3: Operating systems	Duration: 55 min

Day 7: The teacher begins class with a quick, 5 min introduction on the term "storyboard", its function and explains the parts of a storyboard. Students are then told they will eventually be asked to draw a storyboard in class based upon a role-play demonstration. Next, the whole class watches a short, simple video introduction to binary code in relation to bit strings . Teacher then uses the student "playing cards" (described in the Day 1 lesson plan) to role play certain software-related functions. Roles are as follows: 1person to role play a CPU, 3 people each to role play as different programs, 1 person to role play as an operating system. The rest of the students in class role play as "bits," each holding binary code in their hands. Together, with locked arms, these bits are called "bit strings" or "binary code." In the last lesson, students learned about certain types of computer hardware. The teacher explains something is needed to have the hardware and software talk to one another. The teacher asks. "How does the hardware communicate with the software to make things work?"

Next, the teacher has students role play the following scenario in front of class... ""The CPU is responsible for understanding code. The code that it is responsible to understand is called binary code. Binary code is made from bits of data. So bits of data each come with their own binary code and together these bits form (lock arms) to create "bit strings." These bit strings are then sent to the CPU who works extremely fast in trying to decode the code. Once the CPU understands this code, it can then convert this code into instructions for the computer to carry out. Let's say that a bunch of instructions head your way (let's pretend these instructions are printing chores). And you are responsible for carrying out all of these printing instructions at once. So you carry out all of these instructions because you are a software program built to handle all these instructions. Now let's say you have a boss. Your boss comes along and picks you and 2 other "programs" to carry out instructions for him. And he wants the 3 of you to work at the same time doing different things. So the instructions you carry out are printer instructions. You work to print things out. The person sitting next to you is the other program and she's working on different instructions. She is making sure that when someone is typing on the keyboard, the stuff that they are typing gets displayed on the screen. So the CPU tells her what was typed and she displays it. The other person sitting next to you is another program has been instructed to communicate with the internet. So you all are working hard at carrying out these various instructions. Together you make a good system. In fact together you are called an operating system."" Once students have role played the story in front of class, the teacher has them role play again so that they form a better understanding of what is going on. The teacher explains that the natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once. Scientists and students learn to define small portions for the convenience of investigation. The units of investigation can be referred to as "systems." Hence the term "operating systems." Or when relating to jobs, some people are "System Administrators" others may be "System analysts." Next, the students are provided with a blank sheet of paper. They fold the paper so that it makes four quadrants, then they unfold the paper. This paper then acts as their "storyboard." Students are instructed to draw the story they've just role-played, using each quadrant as a new "scene" in the story. This paper storyboard is just a rough draft and won't be turned in. Next, students log into Moodle and select the "Make belief Comics" link. They then use their paper storyboard as a guide to creating their digital storyboard on: httphttp://www.storyjumper.com. When students are finished, students must email their digital storyboard to their teacher. Though the storyboard assignment is an individual assignment, Students are asked to work collaboratively to support individual learning and contribute to the learning of others.

Exit ticket: students must email their digital storyboard to their teacher.

Homework: Students are given a worksheet explaining binary code. The worksheet has 5 problems and a "how to" guide explaining binary code. Students must use math and multiplication (possibly also exponents) to decipher the binary code in order to decode a five-letter word.

Objectives:

- Students will be able to apply properties of operations as strategies to add and subtract rational numbers. (2x2x2) + (2x2) + (2) + (1) = 15
- Students will be able to generate original work in the form of a storyboard for group expression using digital tools.
- Students will be able collaborate to support individual learning and contribute to the learning of others while using digital media.
- Students will be able to compare "systems" as small units of investigation to a larger, much more complex system (our world) which is too large and complicated to investigate and comprehend all at once.

Aligned Washington State Standards:

English Language Arts:

- CCSS.MATH.CONTENT.7.NS.A.1.D Apply properties of operations as strategies to add and subtract rational numbers.

Educational Technology:

- Innovate 1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools.
- Collaborate 1.2 Use digital media and environments to communicate and work collaboratively to support individual learning and contribute to the learning of others.

Science:

- Systems 6-8 SYSF The natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once. Scientists and students learn to define small portions for the convenience of investigation. The units of investigation can be referred to as "systems."

Lesson 4: Microsoft Windows	Duration: 135min

Description: Days 8-9: Teacher explains what a typical step-by-step process looks like using printed instructional manuals. The teacher then explains the role of a wiki. Next, the teacher demonstrates how to create a "how to" guide by creating a wiki within Moodle. The teacher demonstrates by creating a guide in front of class on "How to take a screen capture and use it in a Moodle wiki." Additionally, the teacher establishes clear expectations for safe, legal and ethical online behavior making sure students understand that all wiki edits are recorded and display student names next to each edit. Students are told that in groups, they will create a 15-20 step wiki "How to" guide on how to perform a specific task within the Windows operating system. Each group is assigned a topic and given a household instructional manual to use to help them plan their own "How to" guide. "How to" guide topics include: "How to create a folder on the desktop and add folders to that folder," "how to open and save a word document to a folder," "How to email the teacher," "How to create and manage bookmarks within a browser," "How to share a document in GoogleDocs," and "how to print in black and white to the classroom printer." Using the student "playing cards" (mentioned in lesson 1), students are placed into diverse groups of 5-6 (i.e. a kinesthetic person with a mathematical person) and asked to log into Moodle. They then use Moodle's Wiki creator to create a wiki within their groups which serves as their 15-20 step "how to guide." Students are also provided a rubric for the project and must teach their 15-20 step process in front of class as a group for full points.

Note to Educator: as an alternative to creating a wiki, students can use:
http://www.readwritethink.org/files/resources/interactives/Printing_Press/ to create their "how to" guides

Objectives:

- Students will be able to engage effectively in collaborative group work and discussions with diverse partners on creating a "How To" guide, building on others' ideas and expressing their own clearly.
- Students will be able to generate ideas and create original works for group expression using digital tools.
- Students will be able to communicate in groups using digital media to support individual learning and contribute to the learning of others.
- Students will be able to demonstrate a clear understanding of wikis and practice safe, legal and ethical behavior.

Aligned Washington State Standards:

English Language Arts:

- CCSS.ELA-LITERACY.SL.7.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

Educational Technology:

- Innovate 1.1.1 Generate ideas and create original works for personal and group expression using a variety of digital tools.
- Collaborate 1.2 Use digital media and environments to communicate and work collaboratively to support individual learning and contribute to the learning of others.
- EALR 2 – DIGITAL CITIZENSHIP Students demonstrate a clear understanding of technology systems and operations and practice safe, legal and ethical behavior

Lesson 5: Technology for the future	Duration: 55 min

Day 9: Teacher explains students are going to communicate about the future of technology using a real-time, interactive, digital collaboration board. Next, students log into Moodle and choose one video to watch and one article to read from a list of videos and articles provided. Each of the videos within the list of videos poses authentic, real-world problems and technological solutions to those problems. Then, students must access the teacher's board on realtimeboard.com. Using the teacher-created board on realtimeboard.com, students are asked to provide the link to both the video they watched and the article they read. Then students are asked to provide a thoughtful, summary and review of both the video and the article and publish it to the teacher's board on realtimeboard.com. They then must explain one interesting aspect of both the video and article and why they recommend/don't' recommend their peers watch the video and read the article. Students must also pose one question that elicits elaboration or respond to their peer's questions and comments. Explain to students: the video have been hand-picked to demonstrate that Science and technology are interdependent. Science drives technology by demanding better instruments and suggesting ideas for new designs. Technology drives science by providing instruments and research methods. A rubric is handed out to students that displays expected learning outcomes and scoring guide.

Exit ticket: Students must complete each portion of the assignment by the end of the class period.
Note to Educator: The teacher must have a firm understanding of the realtimeboard.com application and know how to use it within a collaborative classroom setting.

Objectives:

- Students will be able to pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
- Students will be able to incorporate multimedia components and visual displays in presentations to report findings.
- Students will be able to communicate and work collaboratively using digital media to support individual learning and contribute to the learning of others.
- Students will be able to identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry.
- Students will be able to differentiate between Science and technology and know they are interdependent. Science drives technology by demanding better instruments and suggesting ideas for new designs. Technology drives science by providing instruments and research methods.
- Students will be able to differentiate between a small "system" as a unit of investigation and the much larger complex system such as the world.
- Students will be able to demonstrate a clear understanding of technology systems and operations and practice safe, legal and ethical behavior

Aligned Washington State Standards:

English Language Arts:

- CCSS.ELA-LITERACY.SL.7.1.C Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
- CCSS.ELA-LITERACY.SL.7.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

Educational Technology:

- Collaborate 1.2 Use digital media and environments to communicate and work collaboratively to support individual learning and contribute to the learning of others.
- 1.3.1 Identify and define authentic problems and significant questions for investigation and plan strategies to guide inquiry.
- EALR 2 – DIGITAL CITIZENSHIP Students demonstrate a clear understanding of technology systems and operations and practice safe, legal and ethical behavior

Science:

- Application 6-8 APPC Science and technology are interdependent. Science drives technology by demanding better instruments and suggesting ideas for new designs. Technology drives science by providing instruments and research methods.
- Science Systems 6-8 SYSF The natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once. Scientists and students learn to define small portions for the convenience of investigation. The units of investigation can be referred to as "systems."

Please email Courtney for access to the online curriculum guide and to download and modify the documents:

CommonCoreAndCTE@gmail.com

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CHAPTER V

CONCLUSION

The purpose of this project was to determine whether or not a blended learning environment that focuses mainly on incorporating core-subject standards into a current 7th grade FIT course can help to increase 7th grade student core-subject academic performance and then to provide teachers with the curriculum guide used in the study. As illustrated through the research presented within the literature review portion of the project, studies were made to determine change in core-subject academic performance from students exposed to the project. Results of the studies may indicate that the FIT Station-Rotation blended learning environment with its Moodle LMS may have helped to increase students' official core-subject grades as well as retention of various grade-level core-subject standards. Common core standards have rapidly earned widespread approval, with almost all states within the U.S. adopting them as their state's educational standards. It's time CTE educators across the nation take part in this change to help our nation's youth succeed academically. Middle school CTE educators can incorporate core-subject standards into their current curriculum without altering its purpose of providing learning experiences for students to explore careers and develop skills applicable to personal and career roles.

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