FROM DESIGN TO ENACTMENT: A CASE STUDY OF BLENDED LEARNING ACROSS THE CONTENT AREAS IN A K-12 SCHOOL

By

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To my father, Eric, who instilled in me a love of learning and the belief that I could do anything, and to my mother, Louise, for helping me do it

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By

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This study investigated the ways in which four K-12 teachers designed their content area courses using a blended learning approach and how those courses were ultimately enacted with students. All four teachers were part of a blended learning pilot in its first year at a K-12 school in the southeastern United States. Through the lens of constructivism, this study paid particular attention to: (1) the ways teachers enacted blended teaching practices and standards following online professional development on blended learning; (2) the kinds of resources or activities teachers selected and used in the online portion of their blended course; (3) what student activity within the LMS could indicate about the purpose of the instructional materials; and (4) how the design and enactment of blended learning courses differed across the content areas.

Findings from this study revealed that the four courses varied along four continuums. They varied in how much of the course was enacted as designed; levels of student activity; the amount of control students had over time, place, path, and/or pace versus how much of online portion of the course was used in the face-to-face classroom

under teacher direction – referred to here as degrees of blendedness; and whether the course was oriented towards learning from technology or learning with technology. The more experience that a teacher had with teaching in a blended format, the more likely they were to enact their course as designed, have higher levels of student activity, exhibit a greater degree of blendedness, and take an instructional approach of learning with technology rather than from it. Recommendations are made for future professional development in blended learning, for blended teaching practice, and specifically for the profiled school. Additionally, recommendations are made for future research on standards and best practices for blended teaching and learning, the four continuums used in this study to describe blended courses, and models of blended learning as they occur in K-12 settings. This study contributes to the literature on how blended learning models are being implemented in an actual K-12 setting.

CHAPTER 1
INTRODUCTION

In its *National Educational Technology Trends: 2011* report, the State Educational Technology Directors Association (SETDA) identified blended learning as an innovative learning model that encourages students to engage with technology in a student-centered approach (Jones, Fox, & Levin, 2011). While the growth in K-12 online learning has been driven primarily by state-led virtual schools, a growing number of blended learning programs for K-12 students are appearing at state, district, and school levels (Watson, 2008). The growth in blended learning offerings for K-12 students can be attributed to the fact that it offers flexibility, can be more cost effective, and has the potential to personalize pedagogy, allowing students to work at their own pace (Horn & Staker, 2011). Online and blended learning have also been identified as a means of expanding learning time for students in both virtual and traditional schools (Cavanaugh, 2009). In 2009, the United States Department of Education (USDOE) released a meta-analysis finding that "instruction combining online and face-to-face elements had larger advantage relative to purely face-to-face instruction than did purely online instruction" (p. xv) and that "classes with online learning (whether taught completely online or blended) on average produce stronger student learning outcomes than do classes with solely face-to-face instruction" (p. 18) (Means, et al., 2009).

The literature on online and blended learning describes overall outcomes for students (in terms of efficacy as an instructional approach) but does not provide specific information about the kinds of resources or activities that teachers use, or the variety of instructional purposes for which they are designed. There is a need for more information about what occurs in the online portions of blended courses in terms of what kind of

content, resources, or activities are developed in the learning management system (LMS) (Graham, 2006), which of these things seem to promote the most student activity both during and after school hours, and how blended learning practices differ across content areas.

Defining Blended Learning

Blended learning is generally defined as a mixture of face-to-face and online learning or computer-mediated instruction, combining instructional modalities (or delivery media) and instructional methods (Allan, 2007; Bersin, 2004; Graham, 2006; iNACOL, 2011c; Watson, 2008). Some definitions add in the requirements that students must be formally supervised in part at a brick-and-mortar location away from home and at least in part in an online setting and that there should be some element of student control over time, place, path, and/or pace (Horn & Staker, 2011). These definitions differentiate between a more structured approach that blends online and face-to-face delivery with courses that are “web-enhanced” or “web-facilitated”, courses that are essentially face-to-face but use a learning management system or website to distribute course materials (Allen, Seaman, & Garrett, 2007). For the purpose of this study, blended learning is defined as “content and instruction delivered in part online, with some element of student control over time, place, path, and/or pace, and in part in a supervised brick-and-mortar location” such as a school (Staker & Horn, 2012, p.3).

Purpose of the Study

The purpose of this study is to investigate the ways in which four K-12 teachers, following professional development (PD) in blended learning, implemented blended learning strategies, resources, and activities in their content area courses and how

students accessed them in the LMS. Through the lens of constructivism, this study pays particular attention to:

- The ways teachers enact blended teaching practices and standards;
- The kinds of resources or activities teachers selected and used in the online portion of their course;
- What student activity within the LMS indicates about the purpose of the instructional materials; and
- How the design and enactment of blended courses differ across the content areas.

Research Questions

This dissertation study will address the following research questions:

- In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning?
- What kinds of resources or activities are teachers putting in the online portion of their blended course?
- What does student activity within the LMS indicate about the purpose of the instructional materials?
- How does the design and enactment of blended learning courses differ across the content areas?

Context for the Study

Online and blended learning for K-12 students have become legal mandates in some states, including the state where the school featured in this case study is located. Due to provisions in the state's law, public school districts must provide online and blended learning opportunities for students. If they do so by contracting with an established virtual school, they will lose funding for any enrollments in that school; if they provide online and blended learning services within the district, they will keep the funding for those enrollments. As a result, districts throughout the state are working towards establishing their own blended and online course offerings. The school featured

in this case study is in the inaugural year of a pilot program to provide blended learning opportunities in-house as part of a five-year implementation plan towards offering blended learning for all grades 9-12.

To prepare for Year One implementation, teachers wishing to participate in the pilot program submitted proposals to develop curricular materials to support blended learning in their courses at a variety of levels: researching and developing online resources; digital content production; transitioning existing content to the LMS transitioning/developing activities in the LMS; and developing a full blended course. A committee of STEM educators, an instructional designer with experience as a K-12 blended learning teacher, the school's technology and curriculum coordinators, and members of the school's administration reviewed those proposals and selected participants. During the summer immediately preceding Year One, a pilot group of teachers participated in an online professional development course on blended learning in order to deepen their understanding of blended learning terminology, practices, and standards, and to develop a shared language for sharing their blended learning teaching practices as they formed a community of practice and approached the project as a group inquiry. Following completion of the online professional development course, participants were given support by the school's technology department to develop their materials in the LMS. The teachers were then asked to revise and resubmit their proposals as unit plans based on their new understanding of blended learning and their vision for integrating it as an approach in their classrooms. Each participant presented revised proposals and accompanying unit plans to the review committee for final approval just prior to the start of the Year One fall term.

Significance of the Study

Addressing these questions provided important insight into the ways in which teachers employ blended learning strategies across the curriculum for a variety of instructional purposes in a K-12 setting and what kinds of strategies, activities, or resources promote the most student activity both during and after school hours. This study contributes to the field of online and blended education as it provides the educational technology field with further evidence of how blended learning models are being implemented in an actual K-12 setting, provides recommendations for teacher professional development in blended learning, and gives the profiled school with recommendations for Year Two implementation.

Delimitations

To explore the ways in which teachers enact blended learning practices and standards following professional development on blended learning, this study was limited to teachers that participated in a professional development course on blended learning in the summer immediately preceding the semester in which data for this study was collected. To create a unit of analysis for case study, this study was further limited to members of the ninth grade teaching team, as it was the only grade level to implement blended learning strategies in every subject area. The boundary for this case study was the beginning of the summer professional development course to the end of the first semester immediately following the course.

Summary

This introduction sets the stage for this study and why it is important to the online and blended learning community to study teachers' blended learning courses and the blended learning practices that seem to engage students most. Following this chapter

are five chapters. Chapter Two consists of a literature review that provides a foundation through the topics and research that helped to inform the development of this study. Chapter Three, the methodology chapter, provides detail about the theoretical framework, the professional development intervention that preceded this study, the study design, data collection and analysis methods, researcher subjectivity, steps taken to ensure reliability and validity, and limitations of the study. Chapter Four provides the data analysis results of the individual cases while Chapter Five provides cross-case analysis. Chapter Six provides a discussion of the major findings, looks at implications for the blended learning professional development course and the profiled school, and makes recommendations for practice and future research.

Operational Definitions

- **Asynchronous learning** – Online learning in which participants share in communication that occurs at different times, e.g. email, online discussion forums, wikis, blogs, podcasts, etc.
- **Blended learning** – Education in which instruction and content are delivered in part through online delivery with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home.
- **Brick-and-mortar school** – A traditional school that is based in a building where teachers and students meet face-to-face.
- **Learning Management System (LMS)** – A software application for managing and delivering content and administering online or blended courses.
- **Online learning** – Education in which instruction and content are delivered primarily over the Internet.
- **Synchronous learning** – Online learning in which participants share in communication that is simultaneous, e.g. webinars, chat sessions.
- **Virtual school** – A formally constituted organization that offers K-12 education delivered primarily over the Internet.

CHAPTER 2
LITERATURE REVIEW

The goal of this chapter is to provide a review of literature related to this study on the ways that teachers enact blended learning practices and standards following online professional development on blended learning. This chapter is organized into four sections, the first of which discusses constructivism, the theoretical framework that guides this study. The second section provides an overview of the field of K-12 online learning, gives definitions for blended learning, takes a closer look at blended learning research and models for blending in K-12 schools, and discusses professional standards related to K-12 online and blended learning. The third section addresses professional development in blended learning. Finally, a summary is provided at the end of the chapter. This review of literature establishes a context for this study of blended learning and provides a basis for discussing how K-12 teachers enact blended learning practices.

Theoretical Framework

The field of distance education has evolved with each generation of technological advances and new means of communication: from written correspondence to radio and television broadcasts to online platforms (Casey, 2008). When viewed simply as methods of transmitting information, it could be assumed that students would learn from these technologies. This study took the view that the online portion of a blended course is a tool for students to learn with technology. The structure of online and blended courses promotes the use of technology to engage learners in active and intentional learning activities that are learner-centered (Jonassen, Howland, Moore, & Marra, 2003) and give the student some element of control over time, place, path, and/or pace (Horn

& Staker, 2011). An online platform (such as the online teacher professional development course discussed in this study) can be used to foster a community of practice and shared inquiry (Jonassen, Howland, Moore, & Marra, 2003; Garrison, 2011), such as when learners came together in the learning management system to construct a shared understanding and language for discussing blended learning. Following the online professional development course that preceded this study, the teachers used the LMS and other tech tools to build their content area courses, learning through the process of applying their new knowledge (Jonassen, Howland, Moore, & Marra, 2003). This constructivist view is the underlying framework for this study and the lens used to look at how the teachers in this study enacted blended teaching strategies and the resources or activities they incorporated as they built the online portion of their blended courses.

Generally speaking, constructivists postulate that individuals construct knowledge based on their experiences as they build on their existing knowledge, or schema (Yilmaz, 2008). Constructivism is founded in the work of Jean Piaget and Lev Vygotsky and can be classified into different forms, each emphasizing something different about teaching and learning. Six forms of constructivism and the associated theorists include: personal (Kelly and Piaget), radical (Glaserfield), social (Vygotsky and Solomon), social constructionism (Gergen), critical (Taylor), and contextual (Cobern) (Geelan, 1997). Constructivism may alternately be classified into three broad categories: social constructivism, which takes the view that social factors affect the ways in which groups of people form understandings and formal knowledge; psychological constructivism, which suggests that individual learners actively construct meaning around phenomena

dependent on their background knowledge; and radical constructivism, which assumes that external reality cannot be known and all knowledge reflects the perspective of the observer (Yilmaz, 2008). Each of these classifications revolves around the idea of individuals building new knowledge based on their experiences and interactions with others and the larger world. This study looked through the lens of social constructivism at how the courses were designed and made inferences about how they were enacted and the degree to which blending was taking place.

Jonassen, Howland, Moore, and Marra (2003) apply constructivist principles to learning and solving problems with technology, taking the view that technology is a collection of tools to support knowledge construction. In this view technology can help students to access information, to organize and represent students' understandings and beliefs, and to provide a context to support meaningful real-world learning and problem solving. Technology is also a tool for students to communicate and collaborate with others as they articulate and reflect on what they have learned. This study takes the view that such communication and collaboration are hallmarks of quality teaching and learning with technology. Jonassen et al. suggest that for students to learn with technology, teachers must shift to a more facilitative than directive role. Teachers must also have knowledge of the technology used in order to support students through the knowledge construction process. This view of teaching and learning with technology fits well with a blended learning approach because teachers must relinquish some control to students in terms of the time, path, place, and/or pace that learning occurs (Horn & Staker, 2011). Students in blended learning contexts have more autonomy than those in traditional face-to-face settings. The very structure of an online or blended course

promotes a teacher-as-facilitator approach that guides learners as they build understandings, communicate and collaborate with others, and reflect on what they've learned. Content, resources, and activities in the LMS are what Jonassen, Howland, Moore, and Marra (2003) would call "an information vehicle for exploring knowledge" (p.12). For students, this means assuming responsibility, taking ownership, and engaging in learning activities as active, self-regulating learners, not passive recipients of knowledge. In a blended course, students do not have a teacher standing over them directing their activity at all times. To be an effective online or blended learner, students must be able to experiment with technology which leads to "knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription" (p. 15), the hallmarks of constructivist learning with technology (Jonassen, Howland, Moore, & Marra, 2003).

A principal advantage of blended learning is that it expands the means and opportunities for teachers to interact with students, students to interact with other students, and students to interact with content. Teachers can present content online and students can engage in these different interactions as they construct knowledge, participate in conversations, articulate their thoughts, and reflect on what they have learned. In looking for evidence of these different kinds of interactions as part of the featured teachers' blended teaching practices, and in looking at students' online activity, this study looked through the lens of social constructivism. Evidence of these three types of interactions was one of the factors used in considering the degree to which blended learning was occurring, or not.

The next section discusses, in further detail, online and blended learning as an approach to teaching and learning with technology. It provides definitions for blended learning, descriptions of various models of blended learning, and looks at research on blended learning in various contexts.

An Overview of K-12 Online Learning

Online learning as we know it today is just a step in the evolution of organized distance learning that has included correspondence courses, broadcast radio and television, open universities, teleconferencing, and finally online course delivery (Moore & Kearsley, 2005; Casey, 2008). Each of these evolutionary steps has been made possible by advances in technology that have been applied to the field of teaching and learning. After taking hold in higher education, online learning has expanded to include K-12 education. The number of online programs for K-12 students in the United States has expanded rapidly in recent years. Interest in online learning in K-12 schools has grown due to perceptions of increased educational productivity, cost-effectiveness, and improved learning outcomes (Bakia, Shear, Toyama, and Lasseter, 2012; Wicks, 2010). As demand for K-12 online courses grows, many school districts have implemented blended learning as a means to provide students with some of the control and flexibility offered by online courses but within the traditional brick-and-mortar school and the supports that face-to-face instruction provides.

Full-time online programs for K-12 students, known as virtual schools, now exist in all 50 states as well as in Washington, D.C. State-led virtual schools or state-led initiatives now exist in 40 states, accounting for 536,272 course enrollments in 2010-2011, an increase of 19% from 2009-2010 (Watson, et al., 2011). Additionally, other states have state-sponsored online learning initiatives and/or district-sponsored virtual

schools. While enrollments are counted as student registrations for individual courses rather than unique students (Watson, Gemin, Ryan, & Wicks, 2009), it is estimated that the total number of K-12 students taking online courses in the spectrum of virtual school offerings is nearly two million (iNACOL, 2012). Of the state-led virtual schools, Florida Virtual School (FLVS) is the largest in the United States. For school year 2010-2011, FLVS had 259,928 course enrollments, an increase of 22% over the previous year (Watson, et al., 2011), illustrating how rapidly virtual schooling is growing in the United States.

Online learning, of which virtual schooling is one area, is becoming an increasingly popular education option because of the benefits it can offer in terms of flexibility in enrollment and pacing, enhanced interaction, differentiated instruction, and frequent feedback (Hassel & Terrell, 2004; Rhim & Kowal, 2008; Rose & Blomeyer, 2007; Wicks, 2010). Online learning can also be used to compensate for teacher shortages, lack of availability for courses for remedial or accelerated students, to accommodate students with special learning needs, or, in other countries, as a social and economic development strategy (Cavanaugh, Barbour, & Clark, 2009). In online courses offered by school districts, the highest enrollments are in courses for credit recovery and dual-credit (Queen, Lewis & Coopersmith, 2011).

In addition to increasing enrollments, online and blended learning for K-12 students have become legal mandates in some states. In April 2006, Michigan became the first state to require an online learning experience for high school graduation. Since then, Alabama, Florida, Georgia, Idaho, Virginia, and West Virginia have added requirements (iNACOL, 2012). These laws can have an impact on how schools are

funded. For example, in 2012, the state of Florida passed the Digital Learning Now Act, which requires school districts to offer online and blended learning opportunities. Districts must either contract with an established virtual school or provide online and blended learning services in-house. If they contract with an established virtual school, they will lose funding for any enrollments in that school; if they provide online and blended learning services from within the district, they will keep the funding for those enrollments (Florida Statute 1002.321, 2012; iNACOL, 2012). Laws such as this push school districts to establish their own blended and online course offerings, which could be a burden for small and rural districts.

Blended Learning

In comparison to face-to-face and fully online instruction, the combination of the two in the form of blended learning is relatively new and less well researched, particularly in the field of K-12 education. This section will give definitions for blended learning, take a closer look at blended learning research and models for blending in K-12 schools, and discuss professional standards related to K-12 online and blended learning.

Defining Blended Learning

Blended learning is generally defined as a mixture of face-to-face and online learning or computer-mediated instruction, combining instructional modalities (or delivery media) and instructional methods (Allan, 2007; Bersin, 2004; Graham, 2006; Watson, 2008). Some definitions include the requirements that students must be formally supervised in part at a brick-and-mortar location away from home and at least in part in an online setting and that there should be some element of student control over time, place, path, and/or pace (Horn & Staker, 2011). These definitions

differentiate between a more structured approach that blends online and face-to-face delivery with courses that are web-enhanced or web-facilitated, courses that are essentially face-to-face but use a LMS or website to distribute course materials (Allen, Seaman, & Garrett, 2007; Garrison & Kanuka, 2004; Ross & Gage, 2006). Blended learning may include a mix of synchronous and asynchronous learning activities; take place in a range of formal settings, such as a classroom, to informal settings, such as a home; and may vary in terms of the relationships among those in the learning process e.g. individual learning, group learning, or development of a learning community (Allan, 2007; Watson, 2008).

The occurrence and use of blended learning is better documented for a higher education context than it is for a K-12 context (Halverson, Graham, Spring, & Drysdale, 2012). Ross and Gage (2006) identify three forms of blended learning in higher education: 1) the previously described form of web-enhanced courses; 2) blended or "hybrid" wherein online activities are used to reduce or replace part of the face-to-face component; and 3) blended programs that allow students to self-select a mix of face-to-face, blended, and totally online courses to complete program requirements. Ross and Gage posit that the hybrid model of using online activities to reduce or replace face-to-face activities is the "most innovative path, the most difficult to achieve, and where the greatest reward may lie in the long run" (p. 156). Staker and Horn (2012) identify this approach and variations of it as a "flipped classroom" and the form of blended learning most prevalent in K-12 settings. In this approach to blending, the "flipped" part calls for students to watch or listen to lessons or lecture material outside of the face-to-face classroom and to do hands-on activities or guided practice during class time (Fulton,

2012). As teaching in online and blended formats becomes more commonplace, instructors may become so immersed that they don't realize that what they are doing is blended (Picciano, 2009).

There is no single pre-determined division of face-to-face and online learning; it is a mix of any percentage of face-to-face and online learning activities in which the online activities and resources wrap around face-to-face activities or wherein the face-to-face activities wrap around online activities and resources in order to enhance the engagement of learners (Allen, Seaman, & Garrett, 2007). The Sloan Consortium has suggested that blended courses should have between 30 percent and 79 percent of their content online (Watson, 2008; Allen & Seaman, 2013) but in light of more recent research on models of blended learning by Horn and Staker (2011; Staker & Horn, 2012), this distinction seems arbitrary. Blending may occur within a single activity, within the broader scope of a course, across a program that mixes online and face-to-face courses, or at an institutional level (Graham, 2006; Ross & Gage, 2006). The test for "true" blended is the effective integration of the online with the face-to-face such that the two modes are merged as complementary components of a single, blended approach (Garrison & Kanuka, 2004; Osguthorpe & Graham, 2003).

An instructor, or learner, might choose blended learning over other learning options for a variety of reasons including pedagogical richness, increased access to learning, convenience, social interaction in that learners have the flexibility of online learning but the social interaction of face-to-face learning, cost-effectiveness, and the ease of revision of online content (Graham, Allen, & Ure, 2005; Graham, 2006; Shea, 2007). Instructors may also choose to teach in a blended format as a compromise when

challenged to teach online (Picciano, 2009). Despite the advantages and the overall flexibility of blended learning, it is not without challenges. Some barriers to blended learning are issues of access and the digital divide (Allan, 2005; Graham, 2006), student expectations and/or disappointments (Allan, 2007; Bersin, 2004), difficulty for learners to regulate their own learning for online components (Bersin, 2004; Graham, Allen, & Ure, 2005; Graham, 2006), and issues relating to technical support (Allan, 2005; Bersin, 2004; Graham, 2006). These issues are discussed in Graham's (2006) introductory chapter, "Blended Learning Systems: Definition, Current Trends, and Future Directions" in *The Handbook of Blended Learning: Global Perspectives, Local Designs.* Other chapters of the handbook provide examples of individual efforts to overcome these challenges. Halverson, Graham, Spring, and Drysdale (2012) conducted an extensive review of blended learning research literature and identified Graham's as the most cited book chapter, but they also note the lack of empirical research on blended learning, describing most of what is published about blended learning as anecdotal and focused on "definitions, models, and the potential of blended learning" (p. 397).

Research on Blended Learning

The body of literature on blended learning is limited in comparison to the amount of research that has been published on fully online learning. The majority of published papers on blended learning are accounts of unique examples where blended has been implemented to positive effect by blended learning enthusiasts (Gerbic, 2011). Halverson, Graham, Spring, and Drysdale (2012) conducted a study to search for the most-cited articles, chapters, books, and journals on blended learning between 2000 and 2011. Their search yielded 9,500 titles that were then narrowed to identify the top

50 most impactful articles, top 25 edited book chapters, top 10 books, and top 15 other publications, including white papers, reports, and nonacademic journal articles. In their analysis of the literature, Halverson et al observed that only 1.8% of the top cited publications focused on blended learning in K-12 settings while 66.1% focused on higher education, 20% focused on all settings, and 12.5% focused on corporate or organizational training. The majority of publications on blended learning focus on student engagement and outcomes with little focus given to teacher/instructor perspectives (Gerbic, 2011).

In comparing blended learning with face-to-face and fully-online learning, Means et al (2009) conducted a meta-analysis on online learning and found that blended instruction “on average, had stronger learning outcomes than did face-to-face instruction alone” (p. 19) with a stronger effect size for blended than fully-online or traditional face-to-face instruction at a statistically significant level. This may be due to the ability of a blended learning approach to foster a community of inquiry and learning and of open communication where the focus is on constructing knowledge (Garrison & Kanuka, 2004; Osguthorpe & Graham, 2003). It is important to note that comparing online and face-to-face programs is complicated by the fact that many students enrolled in online or blended programs are doing so for a specific reason, such as for credit recovery or enrichment, resulting in a selection bias. Furthermore, the variations in settings of online and blended learning programs and the supports available to students are many and may complicate comparisons with face-to-face programs (WestEd, 2008).

Blended learning has the power to be transformative in that it allows online learners to be “both together and apart, connected to the community of learners anytime

and anywhere, without being time, place, or situation bound" (Garrison & Kanuka, 2004, p.96) although broader evidence is needed to support this claim (Gerbic, 2011). Garrison and Kanuka (2004) suggest that blended learning allows for increases in the quality and quantity of interactions within a course, thus increasing student engagement. In an empirical study to compare types of blended learning environments and student achievement, a group of ninety-three third graders in Taiwan were randomly placed in groups of fully online, blended with student-peer interaction, and blended with student-teacher interaction. The students in both blended groups performed significantly better than the fully-online group; there was no significant difference in achievement between the two blended groups (Chen, 2012). This supports the notion that the increased student-student and student-instructor interaction of blended formats versus fully online contributes to increases in student achievement. Chen did not make comparisons with traditional face-to-face instruction. Using a repeated measures research design, Delialioglu (2012) compared lecture-based and problem-based blended learning environments by offering a course that was lecture-based for the first eight weeks and problem-based for the final eight weeks. The eighty-nine students in the course were given an entry survey to measure student abilities and motivational aspects at the beginning of the study. They were given an engagement survey at the end of the first eight weeks and again at the end of the course. The study found that student satisfaction was equal in both environments but that students were more engaged in the more active learning environment although interaction levels were similar. In the problem-based environment, students spent more time in academic

activities. This finding would suggest that student-content interaction is also a significant factor in designing blended learning environments.

Rovai and Jordan (2004) conducted a comparative analysis between face-to-face, fully online, and blended graduate education courses in which they administered the Classroom Community Scale to measure a sense of community among learners. While they did not report findings for the face-to-face course, they found that the fully online learners felt more isolated and were more likely to misunderstand the tone of an instructor's online posts. The blended group expressed that they liked the structure and support of the blended environment as well as the freedom that the online portion allowed them. Rovai and Jordan identified three areas of change that blended learning could be bringing to education: a shift in focus on learning rather than content delivery; reaching out to more students via distance learning; and promoting a strong sense of community among learners. While these suggestions bear out in other literature, it should be noted that their study used three courses that were not the same subject or content and they had no experimental control over the courses used. These flaws make it impossible to account for other factors that could have impacted students' sense of community.

Wu, Tennyson, and Hsia (2010) conducted an empirical study to look at student satisfaction in blended learning environments and found that learning satisfaction is strongly affected by the learning climate and social interaction as well as the technological functionality of a blended course; increased participant interaction had a positive influence on both performance expectations and learning climate. In a study of university students in the United Arab Emirates, Ishtaiwa and Abulibdeh (2012) found

that using asynchronous tools in blended courses increased student-student, student-instructor, and student-content interactions and promoted deeper learning of the content. These kinds of interaction are key to success in online and blended courses (Anderson & Kuskis, 2007; Wilson & Stacey, 2004). Taking a blended approach and using a LMS to structure content can also increase students' perceptions of themselves as learners, increase levels of engagement, increase confidence, help students to become more autonomous learners, and help students to place more value on feedback as found in a study of Thai university students (Snodin, 2013).

The research on blended learning in post-secondary settings indicates that a blended learning format has the potential to increase levels of student-instructor, student-student, and student-content interaction, factors that have been shown to contribute to student success (Anderson & Kuskis, 2007) and promote higher order thinking skills (Shea, 2007). Whereas fully online environments can make students feel isolated, a blended format would seem to promote open communication and a sense of community. Online aspects of blended courses give students control over the time, place, path, and/or pace that they interact with course content (Horn & Staker, 2011), thus promoting a focus on individual learning and making instruction more student-driven than instructor-controlled. The previously mentioned studies were conducted in post-secondary settings where students are expected to be more independent and responsible for their own learning. In K-12 education, the teacher has traditionally been responsible for the teaching and learning process, with students as passive receivers of knowledge. The next section will look at how blended learning is occurring in K-12 contexts.

Blended Learning in K-12 Contexts

Research on blended learning in a K-12 context

Given the amount of growth in the field of K-12 online learning, there has been little research on blended learning in K-12 contexts. One of the first studies was a 2007 survey of school district administrators about the extent and nature of online learning in K-12 schools (Picciano, Seaman, Shea, & Swan, 2011). In the 2007 survey, an estimated 700,000 students were enrolled in at least one online or blended course, and 66% of the responding districts stated that they expected growth in their blended enrollments (Picciano & Seaman, 2007). In a 2009 follow-up study, the estimated number of students had increased to 1,030,000 (Picciano, Seaman, Shea, & Swan, 2011), or a 47% growth. In addition to studies to identify the number of students in K-12 blended learning courses, research has been done to identify the predominating models of blended learning in K-12 contexts.

Models of K-12 blended learning

How blended learning is delivered in K-12 settings varies. A 2010 study of K-12 blended learning programs identified six models of blended learning as it is presently occurring (Horn & Staker, 2011). Horn and Staker profiled 40 different organizations that already had blended learning programs or intended to offer blended learning in the near future. They examined the programs across several dimensions, including teacher roles, scheduling, physical space, and delivery methods. In their analysis, six distinct models for blended learning emerged (Horn & Staker, 2011). Following the publication of their initial report, Horn and Staker held a pre-conference session at the November, 2011 Virtual School Symposium held by the International Association for K-12 Online Learning (iNACOL) to have roughly 100 educators critique the taxonomy of blended

learning models. In addition, Horn and Staker looked at over 80 K-12 programs to see if their taxonomy held true; in 2012 they revised it from six models to four (Staker & Horn, 2012).

In the initial (2011) taxonomy, the first model is the “face-to-face driver” in which face-to-face teachers deliver most of their curricula in the classroom but use online learning on a case-by-case basis for remediation and supplemental learning. The second approach was the “rotation” model in which instruction is split between the face-to-face classroom and online learning, sometimes split between remote settings and onsite classrooms, and wherein students rotate on a fixed schedule between modalities and settings. The third model is a “flex” model with teachers providing on-site support on a flexible, as-needed basis through face-to-face tutoring sessions and small group instruction; this approach is used by many dropout prevention and credit-recovery programs. The fourth model identified is the “online lab” approach where an online platform is used to deliver the entire course in a lab setting within a traditional brick-and-mortar school environment; teachers or paraprofessionals provide facilitation and support to students in the lab setting. The fifth, and most common, model for blended learning is the “self-blend” model in which students choose which courses to take online a la carte and which courses to take face-to-face. A final, sixth, model is the “online driver” approach where curricula are delivered online and most interaction is done online with periodic face-to-face sessions to monitor student progress (Horn & Staker, 2011).

In the follow-up publication, Staker and Horn (2012) refined their taxonomy from six models to four (Figure 2-1.), eliminating the Face-to-Face Driver and Online Lab

models because they seemed to duplicate other models and their removal would allow more flexibility in classifying the diversity of blended learning models as they occur in practice. The new blended learning taxonomy consists of 1) Rotation model, including Station-Rotation, Lab-Rotation, Flipped-Classroom, and Individual-Rotation; 2) Flex model; 3) Self-Blend model; and 4) Enriched-Virtual model. The new “rotation” model, and the four sub-classifications of rotation, account for transitions between face-to-face instruction and online activity on a fixed schedule. In the “station rotation” approach, students rotate within a given course among classroom-based modalities. In the “lab rotation” approach, students rotate within a given course among locations within a traditional school campus. In the “flipped classroom” approach, content and instruction is delivered online and teacher-guided practice takes place in the traditional classroom on a fixed schedule. The fact that content is primarily delivered online sets this approach apart from students merely doing assignments online outside of school. The “individual rotation” model is rotation within a given course or subject that is customized to individual students and may not require them to rotate to all available stations or modalities. The definitions for the “flex” and “self-blend” models remain the same but the “online driver” approach has been redefined as the “enriched-virtual” model in which students divide their time between a traditional brick-and-mortar campus and learning remotely online, on a less structured schedule than the “flipped classroom”. Many enriched-virtual programs began as fully online virtual school programs but morphed into blended programs in order to provide students with face-to-face learning experiences (Staker & Horn, 2012). For small schools, the rotation format may be a combination of an online instructor and an on-site facilitator to support students. A study

of 93 small, rural schools, over 600 students, 5 online instructors, and 58 facilitators found that having on-site facilitators increases teaching presence and provides students with invaluable social, emotional, and content support (de la Varre, Keane, & Irvin, 2011). As rural schools are increasingly depending on online learning to meet curricular needs, this kind of blending should be investigated further.

Horn and Staker's taxonomy would seem useful in classifying blended learning programs for research purposes, but the sample Horn and Staker used in developing the taxonomy was only forty programs so it is possible that some programs might not fit neatly into one particular model. Therefore the taxonomy should not be used to define blended learning as it is perhaps too confining when compared to the more traditional definition of a blended course, one "that combines two modes of instruction, online and face-to-face" (iNACOL, 2011c). For any of these models to be successfully implemented, teachers need training in related pedagogies and technologies in order to deliver content in the whole range of formats and to design assessments for content presented in various formats (Watson, 2008). Figure 2-1 shows Staker and Horn's models of blended learning (Author, 2013).

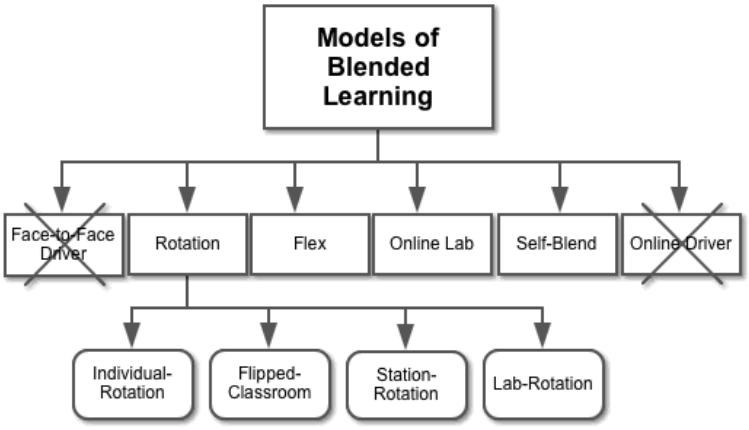


Figure 2-1. Staker & Horn's Models of Blended Learning (Author, 2013)

Professional standards

Professional standards serve to drive those in a particular field to maintain a high standard of practice. As the field of blended and online teaching and learning has evolved, standards for evidence-based practices have been developed by the International Association for K-12 Online Learning (iNACOL), including standards for quality online teaching (iNACOL, 2011a) and quality online and blended courses (iNACOL, 2011b). These standards focus on teacher technological skills, online and blended pedagogy, and course content (iNACOL, 2011a; iNACOL, 2011b). The Southern Regional Education Board's (SREB) *Guidelines for Professional Development of Online Teachers* (2009) cover these same aspects of online teaching practice and were the framework from which the iNACOL standards were initially developed (WestEd, 2008). The current iNACOL standards (iNACOL, 2011a; iNACOL, 2011b) are based on the original standards released in 2007 that have been amended based on results from research and surveys and attention has been given to aligning them with state academic standards, instructional design principles, changes in technology, assessment practices, and course management (iNACOL, 2011b). It should be noted that the iNACOL standards have been criticized because iNACOL has never released reliability or validity data to support the standards (Barbour, 2011). This study used the iNACOL standards as a guide in analyzing the online portion of the teachers' blended courses as they enacted blended learning practices and standards. Teachers in this study also participated in an activity that required them to reflect on their own practice with regard to selected strands of the iNACOL standards for quality online teaching and standards for quality online courses. While the standards have not been put to the tests of reliability and validity, this research deemed them the most accessible and teacher-

friendly guide currently available and considered them representative of best practices for online and blended teaching based on personal experience and review of the literature.

Professional Development in Blended Learning for K-12 Teachers

This study investigated the ways that teachers implemented blended learning strategies, resources, and activities online in their content area courses following an online professional development course in blended learning. Professional development for K-12 teachers in fully online programs has been limited by the lack of published research on best practices in K-12 online and blended teaching (DiPietro, Ferdig, Black, & Preston, 2008) and teacher knowledge of these areas is a concern (Picciano, Seaman, Shea, & Swan, 2011). Aside from state content-area certification requirements, professional development for K-12 online teachers has been left up to schools and has occurred in an ad hoc fashion, varying widely between schools across the United States (Barbour, Kinsella, Wicks, & Toker, 2009). In a 2008 national survey, K-12 online teachers reported higher needs for training in modifying, customizing, and/or personalizing activities and in intervention and/or enrichment of the curriculum than traditional face-to-face instructors in the sample did (Rice, Dawley, Gasell, & Florez, 2008). This would suggest that professional development for K-12 online and blended teachers should do more to address modifying the curriculum and how it is presented so that students can assimilate new knowledge, how to teach more effectively using technology, which technologies are best suited for each content area of the curriculum, and how to bring it all together. Methods for online and blended teaching practice are not yet a standard part of teacher preparation programs but some programs are moving towards virtual practica, observations, and internships (Duhaney, 2012;

Kennedy, 2010). This kind of training will be essential as the number of virtual school and K-12 blended learning programs grows. Training in blended learning could be a useful tool in transitioning from face-to-face to fully online teaching (Duhaney, 2012).

The professional development course that preceded and is described in this study focused on blended learning as the subject matter. While some technological tools were recommended for use in specific types of learning activities, the emphasis was instructional design of a blended course and blended learning as a medium. Specifically, teachers were guided in modifying and customizing lesson and unit plans from their current curriculum and in the use of blended learning approaches to enrich the curriculum. The professional development course called for them to do so in a project-based approach within their current teaching context and was structured to promote a local community of practice within the school as they built a shared vision for blended learning for the school. Each participating teacher focused on developing blended lesson and/or unit plans and online materials to be implemented in their course as part of the school's blended learning pilot program. Throughout the course, they participated in online discussion forums where they shared ideas and experiences and provided feedback to one another on their individual projects. The online professional development course in blended learning is described in detail in Chapter Three.

Summary

The purpose of this study was to investigate the ways in which four K-12 teachers, following online professional development in blended learning, implemented blended learning strategies, resources, and activities in their content area courses and how students accessed them in the LMS. This chapter discussed constructivism as a guiding theoretical framework for this study and how teaching and learning with technology fit

into a constructivist perspective. It also provided an overview of the field of K-12 online learning, gave definitions for blended learning, looked at research and models for blending in K-12 schools and at professional standards related to K-12 online and blended learning. Finally, it addressed professional development in blended learning. This review of literature is to establish a context for blended learning and provide a basis for discussing how K-12 teachers enact blended learning practices and standards following online professional development on blended learning. As discussed, there has been limited empirical research on blended learning, particularly in K-12 contexts, and this study contributes to that knowledge base.

The next chapter will provide a detailed description of the online professional development course discussed in this chapter, a discussion of this study's research methodology, study design, context of the study, data collection and analysis methods, researcher subjectivity, and limitations.

CHAPTER 3
METHODOLOGY

The purpose of this study was to investigate the ways in which four K-12 teachers, following online professional development in blended learning, implemented blended learning strategies, resources, and activities to design their content area courses and how students accessed them in the learning management system (LMS). Through the lens of constructivism, this study paid particular attention to the following research questions:

- In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning;
- What kinds of resources or activities are teachers putting in the online portion of their blended course;
- What does student activity within the LMS indicate about the purpose of the instructional materials; and
- How does the design and enactment of blended learning courses differ across the content areas?

This study looked at a pilot group of teachers as they built on their existing knowledge through professional development and applied their new knowledge while situated in the context of their courses to help their students learn with technology.

This chapter will first look at the professional development intervention that served as a precursor to the present research. The rest of the chapter describes the study's research design, participants, and methods for data collection and analysis. It also addresses researcher subjectivity, reliability and validity, and limitations of the present study.

Description of the Professional Development Course on Blended Learning

This section describes how the professional development course on blended learning was designed and developed, the content that was presented, and how the course participants were selected.

Setting for the Professional Development Course and Present Study

Due to changes in state law, all students must participate in an online or blended course as a requirement for high school graduation, and all school districts must provide online and blended learning opportunities for students. Some districts have opted to contract for services from larger virtual schools while other districts have chosen to establish their own in-house online and blended learning programs. The school featured in this study is unique in that it is one of five special schools within the state to function as its own school district. The school serves approximately 1,150 students in kindergarten through twelfth grades, with a demographic makeup that mirrors the overall demographics of the student population of the entire state. The school demographics at the time of the study were 48% male and 52% female, 23% African-American, .8% Asian, 48% Caucasian, 20% Hispanic, .3% Native American, and 6% Multi-racial. The school is also the developmental research school of a large public university and operates as a unit of the university's College of Education.

Design and Development of the Professional Development Course

The school featured in this case study was in the inaugural year of a pilot program to provide blended learning opportunities in-house as part of a five-year implementation plan towards offering blended learning for all grades 9-12. The pilot planning team consisted of the school's technology integration specialist, secondary curriculum specialist, and this researcher – an instructional designer with experience teaching in a

blended learning format at the secondary level. The planning team first met in the fall of the school year preceding Year One implementation. Development of the online professional development course in blended learning took place from March to May of that year with contributions from the technology integration specialist and a professor in STEM education from the affiliated university. This researcher both developed and facilitated the online professional development course.

In designing the online professional development course in blended learning to support the pilot initiative, the team used the ADDIE approach (Morrison, Ross, & Kemp, 2007). An analysis was conducted of the learners' needs and the instructional problem; a plan for content delivery was designed, taking into account both needs and challenges; content was developed in modular format; the course was implemented with a group of twenty teachers; and a plan was made for formative and summative evaluation to be used to inform the development of the next iteration of the course.

The impetus for this online course was to initiate change at an institutional level within the school as the school prepared to implement blended learning across the curriculum. During the design and development phases of the instructional design process, Knowles' (1984; 1990) principles for adult learning as well as Guskey's (2000) four principles for professional development were applied. Wenger's (1998) concept of "community of practice" was also deemed essential as a means for helping the teachers to be active participants in the practices of the social community (i.e. the school) and to construct identities in relation to the community as they created personal histories with blended learning in the context of the school. Table 3-1 illustrates how these principles were applied.

Table 3-1. Theoretical Approaches to Design of the Professional Development Course

Principle	How it was applied in the course
Knowles' Principles of Andragogy	
K1. Learner-centered and allows the learner to be self-directing	Teachers were given freedom in exploring different tech tools for different activity types based on their needs in their content area.
K2. Allows learners to build on their experiences and is individualized	Projects centered on teachers' individual content areas and classrooms.
K3. Assumes adults become ready to learn when they experience a need to know or do something in order to perform more effectively in their lives	Teachers volunteered to participate in the pilot program. Some teachers had previously attempted to implement blended strategies on their own without training and were seeking more information.
K4. Learning that is problem-centered and task-oriented	Course activities centered around authentic curriculum development projects as teachers prepared materials to be used in their actual courses.
Guskey's Principles of Professional Development	
G1. A clear focus for learners and learning	Content in module format and module objectives clearly stated
G2. There must be an emphasis on individual and organizational change, small changes are guided by a grand vision	Grand vision of change for the school but focus on implementing in individual classrooms to the degree the teacher comfortable with
G3. Professional development should be ongoing and embedded	PD was job-embedded; support provided by school staff following PD
Wenger's Communities of Practice	
Engagement in social practice is key for learning. Communities of practice form as practitioners participate in a common endeavor or shared profession.	Discussion boards were embedded in each module. Teachers were encouraged to discuss what they were learning both within and outside of the online course community. Teachers were encouraged to share their ideas and experiences throughout the course and Module 4 focused on project sharing and group feedback.

Together these different learning principles come together in a framework for online teacher professional development described by Vrasidas and Zembylas (2004) that brings together personal and social constructivism; situated and distributed cognition; and local communities of practice. In this case, the teachers constructed their knowledge through personal reflection and application to their personal teaching context

and group discussion and project sharing; they did so in the authentic setting of their school and classroom; and they developed a local community of practice in the online professional development course that carried over to their physical school building. This approach is supported in the literature on project-based professional development for teachers studying online and blended teaching. The most useful approach is not to focus on technological skills but to support teachers to develop effective practice by using authentic project-based learning, while embedded within their own context and to include strategies to promote relevant organizational development (Dabner, Davis, & Zaka, 2012; Wilson & Stacey, 2004). Within the field of teacher professional development in technology, a problem-based approach has been found to bring about greater gains than a technology-only approach (Walker, et al., 2012). For this reason, the pilot implementation team decided that the best way for the teachers to learn to apply blended learning tools and strategies was to do so as an inquiry project in problem-based format as they designed a complete activity, lesson, or unit plan (determined by the school and varying among course participants) to implement blended learning in their classroom. Curriculum specialists at the school provided support after the course to help the teachers as they transitioned from learners to blended learning practitioners. The school's curriculum and technology integration specialists approached the project from a curricular standpoint rather than a technological one and focused on helping teachers to identify activities and tools to support student achievement of learning outcomes. Two graduate students were assigned to assist the teachers with putting material online and in learning how to optimize the tools within the LMS. This support helped them to reassess their course

goals, objectives, and design to encourage fundamental instructional enhancements as suggested by the findings of a study by Wingard and the Learning Technology Consortium (2004). Such an approach uses an authentic task wherein the teachers are applying new knowledge about pedagogy and content as they use their existing technological skills. Focusing on improving the instructional design of an online or blended course would seem to be a better use of resources since technology changes so rapidly; the key is in understanding the role of technology in the teaching and learning process rather than the ability to use a specific tool.

In selecting materials for the online professional development course, Bower's (2008) framework for affordance analysis for online learning was also applied. Bower calls for the identification of the overarching educational goals, proposal of general tasks based on the experience of the designers, appreciation of affordances to support tasks, to determine affordance requirements of the tasks (e.g. usability, readability, accessibility, etc.), to determine the technological affordances available (e.g. what tech tools are available), and then the integration of the available and required affordances to form a specific task design in an iterative process. This process was used to select materials and design activities for the online course. Technology tools were recommended for implementation in participants' deliverables but were not required as each of the teachers worked in a different content area and/or a different grade level. For example, the use of mind-mapping software for pre-writing might have been recommended for language arts teachers while online simulations might have been recommended to a science teacher. Content was presented in the LMS with usability and accessibility principles in mind to comply with Americans with Disabilities Act

(ADA), Section 504 and 508 requirements, and the W3C's web accessibility initiative (WAI) guidelines (http://www.w3.org/WAI/). In an online, constructivist learning environment, cognition must be situated and understood in terms of the setting, purposes, tools and tasks in which the knowledge is to be learned (Mishra, 2002). Moore and Kearsley (2005) suggest that every learner has to construct knowledge through a process of personally accommodating information into existing cognitive structures; changes in learners' understanding results from interacting with content. To ensure an in-depth learner-content interaction, the content in the online professional development course was selected for relevance and challenge and was carefully organized (Wang, Teo, & Woo, 2009). Modules were created to help manage the teachers' expectations by assisting them in keeping up with the required pace and tracking assignment due dates (Fish & Wickersham, 2009). Assignments were described in the context of the larger problem so that the teachers didn't see individual assignments as just tasks. Since context is important in constructivist learning, clear linkage of concepts was provided (Duffy & Kirkley, 2004). Navigation was kept as simple as possible – focusing on the areas teachers visited most throughout the course, chunking content, and identifying relevant tasks to promote usability (Carter, 1999; Miller-Cochran & Rodgrigo, 2006; Crawford-Ferre & Wiest, 2012). Keramidas, Ludlow, Collins, & Baird, (2007) highlight the importance of investing time in course development, recommending a simplistic course design, focusing on critical components and organization that promotes transparent navigation. For these reasons, content was presented in four modular chunks and resources were embedded within modules; this brought all the pieces together and made it clear to learners what was

expected of them. Taking a learner-centered approach and chunking content into contained modules is also better from an accessibility standpoint (Coombs, 2010).

Although the professional development course itself was fully online, participants all worked in the same school and were provided with support by the school's technology integration specialist and secondary curriculum specialist following completion of the course. Teachers were encouraged to discuss what they were learning and how they could apply it through team meetings and individual consultations with the curriculum and technology specialists as well as in the discussion forums embedded within the online course. This kind of learning community has what Matzat (2013) calls a "high level of embeddedness" (p. 41); that is, a high proportion of offline relationships that contributes to participation in the online environment. In a study of professional development for Dutch secondary teachers, this approach was found to improve their teaching skills and knowledge of the subject more than a purely online environment (Matzat, 2013).

Selection of Course Participants

To prepare for Year One implementation, in April of the preceding school year, teachers submitted written proposals to develop curricular materials to support varying degrees of blended learning in their courses: researching and developing online resources; digital content production; transitioning existing content to the LMS; transitioning/developing activities in the LMS; and developing a full blended course (Appendix A). Some teachers did not feel ready to take on a full course development and instead chose to attempt lesser degrees of blending while they became more comfortable with the LMS and developed their technological knowledge. Each of these degrees of blending would fit in Staker and Horn's (2012) rotation model of K-12

blended learning. A committee that consisted of school administrators, curriculum specialists, the technology integration specialist, educational technology and STEM faculty from an affiliated college of education, and this researcher reviewed the teachers' proposals. The reviewers used a common rubric to assess each proposal (Appendix B). Of the seventeen proposals submitted, two were joint proposals by pairs of teachers and one other proposal was not funded. Sixteen proposals were funded and teachers received a stipend to support their development work and participation in the online professional development course in blended learning.

The Online Professional Development Course in Blended Learning

During the summer of 2012, immediately preceding Year One, the pilot group of seventeen teachers, representing middle and high school grades and the content areas of English/language arts, math, science, social studies, art, and physical/health education, participated in an online professional development course on blended learning in order to deepen their understanding of blended learning terminology, practices, and standards, and to develop a shared language for sharing their blended learning teaching practices as they formed a community of practice and approached the project as a group inquiry. Although spread over eight weeks from May to July, the course was structured in four modules: 1) Setting the Stage, 2) Where Are We Now, 3) Strategies for Blended Learning, and 4) Project Sharing and Curriculum Development (Figure 3-1). Module 1 provided an overview of K-12 online learning, definitions for blended learning, and models of blended learning. Discussion prompts embedded in this module also served to kick-start a school-wide conversation about blended learning and to bring the teachers together as a community of practice. Module 2 focused on the iNACOL standards for K-12 online courses and online teaching and asked teachers to

reflect on and evaluate their own practices and current courses to those standards. While the standards have not been formally tested for reliability and validity, this research deems them the most accessible and teacher-friendly guide currently available and considers them representative of best practices for online and blended teaching based on personal experience and review of the literature. Module 3 presented the technological pedagogical content knowledge (TPACK) model, different types of activities and tech tools that could be used in a blended learning course, and examples of complete lesson plans with ideas for adapting them to a blended learning format. Module 4 employed a problem-based learning approach by having the teachers apply their new knowledge of blended learning to modify their proposals, develop unit plans, and create content within the LMS.

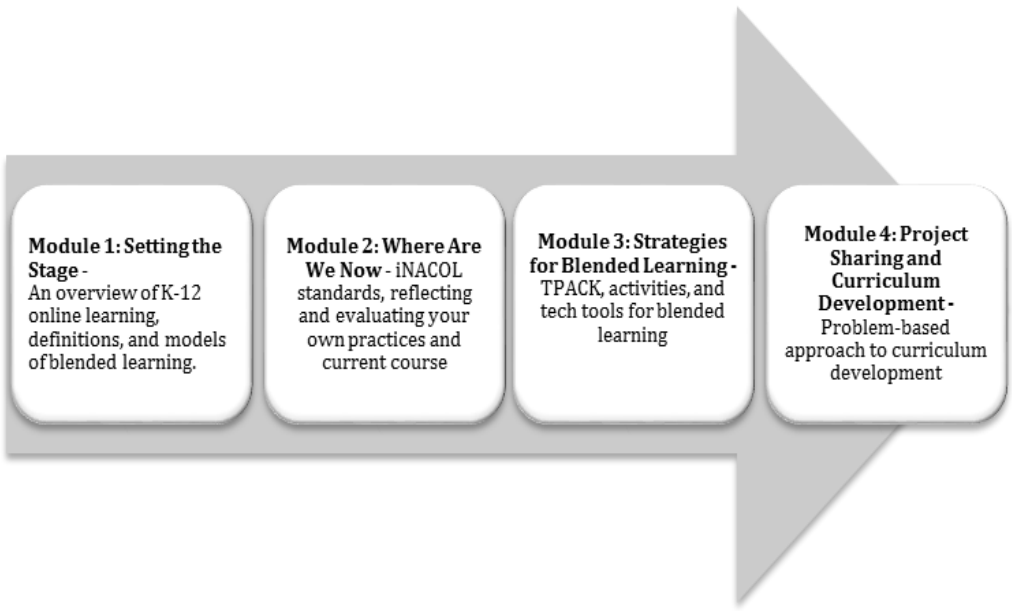


Figure 3-1. Online Professional Development Course Structure

Each module included content material and resources, discussion forums, and an application activity that pushed teachers to think critically and apply their new knowledge. See Appendix C for course learning outcomes and objectives and content from each of the four modules.

Following completion of the online course, participants were given support by the school's technology department to develop their materials in the LMS. The teachers were then asked to revise and resubmit their proposals as unit plans based on their new understanding of blended learning and their vision for integrating it as an approach in their classrooms. The same committee that selected teachers for participation in the pilot evaluated the revised proposals and unit plans. The purpose of this study was to investigate the ways in which four teachers from the pilot implemented blended learning strategies, resources, and activities in their content area courses, specifically looking at the ways the teachers designed their courses using blended teaching practices and standards; the kinds of resources or activities teachers selected and used in the online portion of their courses; and what student activity within the LMS indicates about how the teachers' course designs were enacted, and how the design of blended learning courses and student activity patterns differed across the content areas.

Research Design

A case study is done to shed light on a phenomenon such as a program, curricula, roles, and events (Gall, Gall, & Borg, 2003; Simons, 2009). In conducting a case study, researchers draw on multiple sources of information such as observations, interviews, documents, and archival records (Yin, 2009; Creswell, 2007; Simons, 2009; Stufflebeam & Shinkfield, 2007). Data can be

analyzed in a collective case (or multiple case) approach in which multiple cases are used to examine multiple perspectives or aspects of an issue (Creswell, 2007). Yin (2009) suggests that multiple case study design uses logic by replication because the researcher replicates the procedures for each case. While this study featured a single grade level in a single educational program, it investigated the blended learning practices of four teachers in four different content areas, treating them as multiple cases. The same information was collected for each case and analysis was done within each single case and across the multiple cases.

In identifying the number of cases to be included, Yin (2009) suggests that for multiple case designs, the number of cases included should be the number of cases "deemed necessary or sufficient for your study" and states, "the typical criteria regarding sample size are also irrelevant" (p.58). For this study, four was considered the sufficient number of cases because it represented the content area courses required of all ninth grade students and was enough to provide representative data. The four selected cases also represented a majority of the teachers on the ninth grade team; using cases from a single grade level allowed for comparisons to be drawn across cases in a replication design without interference from additional variables such as differences in grade level, course content, student population, and class time.

A case is a bounded system with boundaries that may shift in the course of conducting the study and analyzing data; sometimes the final boundary doesn't

become clear until near the end of the study (Simons, 2009). This study used the following boundaries:

- Time frame – The time boundaries for this study extended from the beginning of the summer online professional development course on blended learning to the end of the first semester of Year One.
- Cases – Each teacher and their course was treated as a single case, with analysis across teachers in a multiple case design.
- Sources of Data – Data was collected from the online portion of the ninth grade blended learning courses after the end of the first semester of Year One.

Participants

This study looked at the blended learning practices of high school teachers in a K-12 public school in the southeastern United States. Participants for this study were selected from the pool of ninth grade teachers who opted to do full blended course development and then enacted it in their classrooms.

The ninth grade teaching team was selected to do full blended course development and was the only grade level to apply blended learning across all content areas. For this reason, this case study focused on one teacher from the content areas of Algebra I, Biology I, English I, and health/physical education (H.O.P.E.) in the ninth grade. Two additional teachers, who taught Spanish I and World Geography, completed the online professional development course and were initially involved in the pilot but dropped out for personal reasons. To protect their privacy, teachers are heretofore referred to with pseudonyms.

- Algebra I, “Anne” has been teaching at the K-12 level for nearly thirty years – twenty-five of which have been at the high school level. Her bachelor’s and master’s degrees are in mathematics education. She holds a doctorate in the social sciences as well. Anne is certified in mathematics (grades 6-12) with the English for Speakers of Other Languages certificate endorsement. She has been at the profiled school for six years. Her prior

experience with online and blended learning consists of teaching a couple of university courses that were “web-enhanced” as students submitted assignments and participated in discussion boards online but all other instruction was face-to-face. Anne has fifteen computers in her classroom for student use.

- Biology, “Barbara” has been teaching high school science for fourteen years, the past ten of which have been at the profiled school. She holds a bachelor’s degree in zoology, a master’s degree in secondary science education, and a specialist’s degree in teacher leadership. She is certified in Biology, Chemistry, and Earth-Space Science grades 6-12. Barbara has twenty-five computers in her classroom, giving her 1:1 availability. Last year, she began to use the LMS in her courses for formative and summative assessments, including state-required end-of-course exams. She also used it to store content online and post assignments but used it only minimally for learning activities in and out of the classroom. She has never taught a fully online course.

- English/Language Arts, “Ellen” has been teaching for six years, the past five at the high school level in the profiled school. She holds a bachelor’s degree in public relations, a master’s degree in secondary English education, and is in the process of earning a specialist’s degree in literacy and the arts. She is certified in English (grades 6-12) with the English for Speakers of Other Languages certificate endorsement. She has been using blended learning as part of a unit-long writing partnership project for five years but is now applying it for all units in her course. Ellen has fifteen computers in her classroom for student use.

- Health/Physical Education (H.O.P.E.), “Helen” has been teaching high school health and physical education at the profiled school for eight years. She holds a bachelor’s degree in health education and sports administration and is certified in health education (grades K-12) and physical education (grades K-12). This pilot is her first experience with online and blended learning. She has fifteen computers in her classroom for student use.

Data Collection and Analysis

Data for this study was collected from the LMS and included:

Qualitative Data Sources:

- The content (resources, materials, and activities) of the online course shells that teachers developed for their blended courses for the first semester; and

Quantitative Data Sources:

- Quantitative activity log data from the Moodle LMS for the first semester.

All data collected has been compiled into a case study database that could be used by another researcher to conduct the same case study again in a test of reliability (Yin, 2009). Additionally, all data has been recorded in an audit trail that documents how data was analyzed and the coding process (Gall, Gall, & Borg, 2003; Creswell, 2007).

When coding data for a multiple case approach, each case is described and put in context, generalizations and assertions are stated, and data is coded for within-case theme analysis (Case #1 themes, Case #2 themes, Case #3 themes) and cross-case theme analysis (similarities among cases, differences between cases) (Creswell, 2007; Yin, 2009).

Qualitative Analysis

Content analysis

Content analysis is a technique used to extract information from a body of material by using explicitly defined, objective procedures of analysis to code, or classify, material in order to better understand it (Smith, 2000). Content analysis is frequently used to describe and analyze mass media material (Smith, 2000; Neuendorf, 2002). As a research technique, it seeks to make replicable and valid inferences from data to their context (Krippendorff, 1980; Neuendorf, 2002). One approach to content analysis is descriptive content analysis in which material is coded in an almost archival fashion and conclusions are limited to the content being studied (Neuendorf, 2002). Sources of data can be classified as archival, naturally occurring, and elicited (Smith, 2000). In this study, the content of the

teacher's online course shells for their blended courses was considered naturally occurring.

Sampling in a content analysis approach depends on defining the population into a set of units to be studied. In the case of a small population, it may not be necessary to draw a smaller representative sample of the population (Neuendorf, 2002; Smith, 2000). The optimal size for a sample depends on the goal and characteristics of the proposed research as well as factors such as time, money, and personnel available (Smith, 2000). For this study, the sample was reduced from all teachers participating in the school's blended learning pilot to those teachers on the ninth grade team. This decision was made based on the design of this study as a case study; the ninth grade was the only grade implementing blended learning in all subject areas. All six members of the ninth grade team completed the online professional development course, however two of them withdrew from the pilot program at the start of the school year due to personal issues. While the selected cases represent a convenience sample due to the ready availability (Gall, Gall, & Borg, 2003), the researcher believes that they are representative of how teachers in this school enacted blended teaching practices and standards. By using members of the same grade level team, this study was able to look at within-case themes in each course and across-case themes across the grade level. As a dissertation study, time, expense, and personnel were also a concern.

Coding systems for content analysis require identification of the units of material to be analyzed, categories or dimensions of classification, and rules for

applying the coding system (Smith, 2000). Units for coding may be narrow or broad and should be chosen based on the aims of the research (Krippendorff, 1980). There should be only one code for each and every unit coded. Material was examined using an empirical approach and codes were identified as they emerged from the material.

Analysis of online course content

For this study, the contents of the online course shells were coded based on a number of variables:

- Course organization (as modules, weeks, or topics);
- Structure and organization of content (clear introduction, identification of objectives, readings and resources, and delineation of what is face-to-face versus what is online);
- Types of instructional resources (content information – print (e.g. PDF of a chapter), content information – multimedia (e.g. online video), procedural information (e.g. lab directions), downloadable activity (e.g. worksheet), online activity within the LMS (e.g. online quiz in the LMS), or online activity outside the LMS (e.g. activity on another website));
- Instructional purpose of resources (dissemination of content information, dissemination of procedural information, group discussion, introduction of new concepts or skills, skills practice or review, and assessment);
- Instructional approach (collaboration or cooperative learning, group discussion, research activity, direct instruction / lecture presentation, other); and by
- LMS tools used (identified by the LMS as an “activity” type or a “resource” type).

Activities in the LMS were coded by the LMS tool that was used as in the case of online quizzes, assignments that call for students to upload a single file (an assignment type in the LMS), or downloadable content in the format of Word or PDF files using the “link to a file or resource” tool. For each activity or

resource, the choice of tool and how it is presented in the course shell can be indicative of instructional purpose. For example, one course showed that the majority of the resources in the online portion of the course were video presentations and PDF readings and students weren't working actively online. There were very few assignments that called for students to submit their work in the LMS. One assignment asked students to view a linked video online, download a PDF reading on the topic, and then gave them nearly a month to compose and submit an essay on the subject. These examples would seem to indicate that the teacher was following a traditional classwork-homework paradigm but gave students some control over time, place, path, and/or pace. This inference was supported by the way the teacher structured the content on the course's main page: each topic included a section for Learning Targets, Readings, In-Class Presentations, What to Do Online, and What We Are Doing F2F. Coding and interpretation of the content in the course shell was from a constructivist perspective and focused on choices of tools and activities and their apparent instructional purpose and how they guided students to build understanding of the content with technology. Findings from each case were compared with the others to identify similarities and differences. Cross-case comparisons shed light on how teachers used the online course shells for different instructional purposes, learning tasks, and how teachers enacted blended learning strategies differently.

Quantitative Analysis

Case studies often draw on both qualitative and quantitative data to create a complete picture of the phenomenon being studied (Yin, 2009). For this study,

textual data was studied qualitatively using content analysis. In addition to the qualitative data collection and analysis, quantitative data was drawn from the LMS and analyzed using Excel spreadsheets. Simple descriptive statistics were calculated for log data showing the numbers of different kinds of tools or activities used in each of the cases/courses as well as the numbers of times they were accessed by students and when. Variables that could be calculated from the top-level activity logs in Moodle include:

- The number of times a course was accessed during school hours and during non-school hours;
- The number of school days and non-school days a course was accessed;
- The number of students accessing the course during school hours and during non-school hours; and
- The dates and times course resources were accessed by students.

Together these variables provided an indication of whether each course fit the definition of blended learning and the percentage of student use for both school and non-school hours. Simple descriptive statistics were used to calculate cumulative totals for usage for each month and the semester as a whole.

Researcher Subjectivity

In qualitative research, the researcher is both the collector and interpreter of data. In these roles, it is essential for the researcher to consider their own experiences and potential biases as it might impact the collection and interpretation of data (Gall, Gall, & Borg, 2003). As the researcher, I have to consider my own potential biases and past experiences. I approach this study as someone with experience as a K-12 teacher in face-to-face, blended, and online settings and as an instructional designer for higher education online and blended

courses. I have seventeen years of experience at the K-12 level, thirteen of which were as a teacher and curriculum specialist in a special school for students aged 3-21 with sensory impairments. Like the school featured in this study, the larger school was split into elementary, middle, and high school departments. I spent several years at the middle school level teaching a variety of subjects and, as an early adopter, became the building technology coordinator and trainer in addition to my regular teaching duties. After writing a successful grant proposal, I became one of the first teachers in the school to have an interactive whiteboard and a digital video camera. With the advent of handheld computers, I became the grade level coordinator for a pilot program of handhelds in the classroom and later for a pilot of 1:1 laptop use. I then moved to the curriculum department serving the high school program as coordinator of the Learning Opportunities Center (LOC), a center for distance and independent learning. In the LOC I supported students taking fully-online courses with a large virtual school and taught other courses in a blended format; these courses included English/Language Arts, Intensive Reading, pre-Algebra and Algebra I, American Government, American History, Marine Science, and Spanish I. While working in the LOC, I began to wonder about blended and online learning in other settings, forming questions that drove me to my current doctoral studies. Since then, I have also taught both blended and fully online courses at the college level. My experiences as a K-12 teacher, curriculum specialist, and early adopter of new technologies may have given me unique insight into the practices and experiences of the teachers in this pilot blended learning implementation.

While a doctoral student, I was also employed as an instructional designer and distance education specialist, first at the university I attended and then at a smaller public college. In those positions, I provided instructional design services to instructors of blended and online courses as well as developing and facilitating professional development for instructors and advising administrators on matters of distance education policy. My professional position at the university led to my initial involvement as a consultant for the blended learning pilot program featured in this study. In that role, I participated in the development of the five-year implementation plan, developed and facilitated the summer online professional development course, and served as a reviewer for the teachers' proposals and final unit plans. My participation in these activities was done remotely.

Reliability and Validity

In both qualitative and quantitative research, researchers must take steps to establish trustworthiness of their findings such that another researcher could repeat the study with the same outcome (Creswell, 2007; Glesne, 2006).

In case study research, reliability is a test to ensure that, if another researcher conducted the same case study over again, the results of the study would be the same, finding minimal errors or biases in the first study (Yin, 2009; Gall, Gall, & Borg, 2003). In this study, multiple methods were employed to investigate how teachers enacted blended learning practices in their own courses following online professional development on blended learning. Content analysis of the course shells showed what kinds of strategies and activities the teachers used to present information and engage students in their courses. Data from activity logs showed when and how often students accessed that information and

activities as an indicator of enactment. All of this data has been compiled in an electronic case study database that could be used by another researcher to conduct the same case study again in a test of reliability (Yin, 2009). Additionally, all data has been recorded in an audit trail that documents how data was analyzed and the coding process (Gall, Gall, & Borg, 2003; Creswell, 2007). Treating each teacher's course as a separate case, and doing in-case and across-case analysis helped to confirm findings (Simons, 2009; Yin, 2009).

In descriptive or exploratory case study research such as this multiple case study, internal validity is difficult to determine because so many inferences have to be made when an event is not directly observed and is mainly a concern of explanatory case studies, which this study is not (Yin, 2009). Findings of this study will be shared with members of the iNACOL research committee, a group of K-12 online and blended learning researchers, to see if they find the case study credible and useful in an effort to promote external validity (Creswell, 2007; Glesne, 2006; Simons, 2009, Yin, 2009). Another means of assuring trustworthiness is to clarify researcher bias as has been done in this chapter (Yin, 2009).

Limitations

There are several limitations to this study that are worth noting. The focus of this study was blended learning in a K-12 environment. Findings from this study are not generalizable to traditional face-to-face or fully online settings or to education outside of the K-12 context. This case study is bounded in one grade level of one K-12 school, so findings may not be generalizable to other contexts. Another limitation is that content analysis methodology usually employs more

than one reviewer to ensure reliability and validity of findings (Neuendorf, 2002) but only this researcher was involved in the content analysis portion of data collection and analysis for this study. Finally, this study was limited to the online portion of the teachers' blended learning courses; a complete picture of their courses could not be formulated without observation of the face-to-face portion of the courses, the teachers' lesson plans, or interviews with the teachers themselves.

Summary

A case study approach within a constructivist framework provided a means for identifying themes and creating thick description of the phenomenon of blended learning in a K-12 school setting. This chapter first looked at the professional development intervention that served as a precursor to the present research, including its design, development, and the content covered. The rest of the chapter described the study's research design, participants, and methods for data collection and analysis. It also addressed researcher subjectivity, reliability and validity, and limitations of the present study. The next chapter will discuss the data collected and findings of the individual cases.

CHAPTER 4
ANALYSIS OF INDIVIDUAL CASES

This study addressed the following research questions: (1) In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning; (2) What kinds of resources or activities are teachers putting in the online portion of their blended course; (3) What does student activity within the LMS indicate about the purpose of the instructional materials; and (4) How does the design and enactment of blended learning courses differ across the content areas? To address these questions, a multiple case study was conducted to look at how four teachers in four different content areas (Algebra, Biology, English, and Health/Physical Education) designed the online portion of their blended courses and how those designs were enacted.

Each of the cases is presented below. Each case begins with a description of the instructor and their experience and continues with an overview of the course, a closer look at a single module, findings from the LMS activity logs, and a discussion of case findings by research question. This chapter examines each case as it relates to research questions (1), (2), and (3); research question (4) will be addressed in the next chapter. To address research question (1), each case was analyzed using a rubric aligning a checklist of features of quality online and blended courses, as identified in the research literature, with the International Association for K-12 Online Learning (iNACOL) *Standards for Quality Online Courses, Version 2* (iNACOL, 2011b). Research questions (2) and (3) were addressed using data gathered from analysis of the content in the

course and student activity data logs generated by the LMS. Research questions will be addressed throughout each case description and summarized in a section at the end of each case.

Case I. Algebra I

Instructor Information

"Anne" has been teaching at the K-12 level for nearly thirty years – twenty-five of which have been at the high school level. Her bachelor's and master's degrees are in mathematics education. She holds a doctorate in the social sciences as well. Anne is certified in mathematics (grades 6-12) with the English for Speakers of Other Languages certificate endorsement. She has been at the profiled school for six years. Her prior experience with online and blended learning consists of teaching a couple of university courses that were web-enhanced as students submitted assignments and participated in discussion boards online but all other instruction was face-to-face. Anne has fifteen computers in her classroom for student use.

Course Overview

The online content in the Algebra I course was arranged in highly structured lessons that were broken down in segments (1.1, 1.2, 1.3…), for a total of 27 modules in the first semester. Each module began by giving the relevant state standard, an essential question, and a learning outcome written as an "I can…" statement, setting a clear purpose for learning, but not putting the content into context. Students began each module by taking a teacher-created lesson quiz; their score on the quiz prescribed which resources they must view and activities they must complete. For example, students scoring 4/6 on the quiz were required

to visit an external website for additional practice before retaking the quiz; students scoring 3/6 or below on the quiz had to visit the review website, view video tutorials and summarize at least one of the videos in a blog activity, and complete an online review activity – submitting a printed copy of their results, before retaking the quiz; students scoring 2/6 or below on the quiz had to complete all of the above-listed activities and submit all activities before being allowed to retake the lesson quiz. Online materials and activities were selected by the teacher and were external to the course textbook and included video tutorials, external webpages, and online review games for skills practice, as well as downloadable PDF study guides for chapter tests. Resources were well-organized on pages with clear directions for students. The majority of activities and resources were linked from, rather than embedded in, the LMS. With the exception of one video, resources within, and external to the LMS, were reviewed and on the surface met the W3C's web accessibility initiative (WAI) guidelines (http://www.w3.org/WAI/). There was no reference as to what was occurring in the face-to-face portion of the course for each lesson segment/module.

The primary online activity in the course was the lesson quizzes with additional activities provided for remediation based on quiz scores. Quizzes were 4-6 questions in length and were computation items, sometimes requiring that students justify their answer; all were open response with no multiple-choice items. Students were allowed two attempts on each quiz – once at the beginning of the module and another after they had completed the activities prescribed by their score. Activities in the module supported skills development and step-by-

step processes to solve algebraic problems and prepare students to retake the quizzes.

Students were assigned different learning activities based on lesson quiz scores but there was no indication of collaborative learning or higher-order thinking skills in the online portion of the course although those aspects might have been present in the face-to-face portion of the course. Although discussion forums were created for activities within the course, there were no student responses to any of the prompts because the discussions were not enacted with students.

Looking at a Module

In looking at the Algebra I course, the fifth module, Lesson 1.5 (Figure 4-1), was representative of the other modules in the course. It began with a review quiz on an external website (softschools.com) that was required of all students before they took the Lesson Quiz in the LMS. Students scoring 3/5 or above were required to visit an additional review website with the game “Walk the Plank: Adding and Subtracting Integers”, revisit the quiz at softschools.com, and then retake the lesson quiz. Students scoring 2/5 or below were also required to visit the review websites as well as a step-by-step tutorial at purplemath.com, view a tutorial video and play a review game at the BrainPOP website (http://www.glencoe.com/sec/math/brainpops/00112034/00112034.html), participate in an activity at the National Library of Virtual Manipulatives website (http://nlvm.usu.edu/en/nav/frames_asid_162_g_2_t_1.html?from=grade_g_2.html), and view a tutorial video at the Khan Academy website (https://www.khanacademy.org/math/arithmetic/absolute-

value/adding_subtracting_negatives/v/adding-subtracting-negative-numbers). Students were then asked to participate in a “blog” activity to create a summary of one of the videos they viewed; however, the “blog” was actually a Google form that students submitted to the teacher. While it was called a blogging activity, the activity itself does not fit the usual characterization of a blog as a Web 2.0 tool for students to publish their ideas and engage with others (Richardson, 2009). Students’ responses were not available for this research. Students had to complete these activities before they were allowed to retake the lesson quiz. The emphasis on remediation in preparation to successfully pass the lesson quiz suggested that the primary concern and purpose in the design of the online modules was assessment and remediation, with differentiation in activities based on quiz scores but not differences in learning style or ability. Because there was no mention of what was occurring or being covered in the face-to-face portion of the course, and because all of the activities focused on basic skills review, it was assumed that the teacher’s intent was to use the face-to-face time for primary instruction and the online space for progress monitoring or as a means to identify struggling students. Figure 4-1 is a screenshot of a representative module from the Algebra I course.

Activity Logs

Based on quantitative analysis of the activity logs within the LMS, the majority of student activity in the Algebra I course took place during school hours (Table 4-1), suggesting that activity in the online medium was teacher-directed and done as part of the face-to-face time.

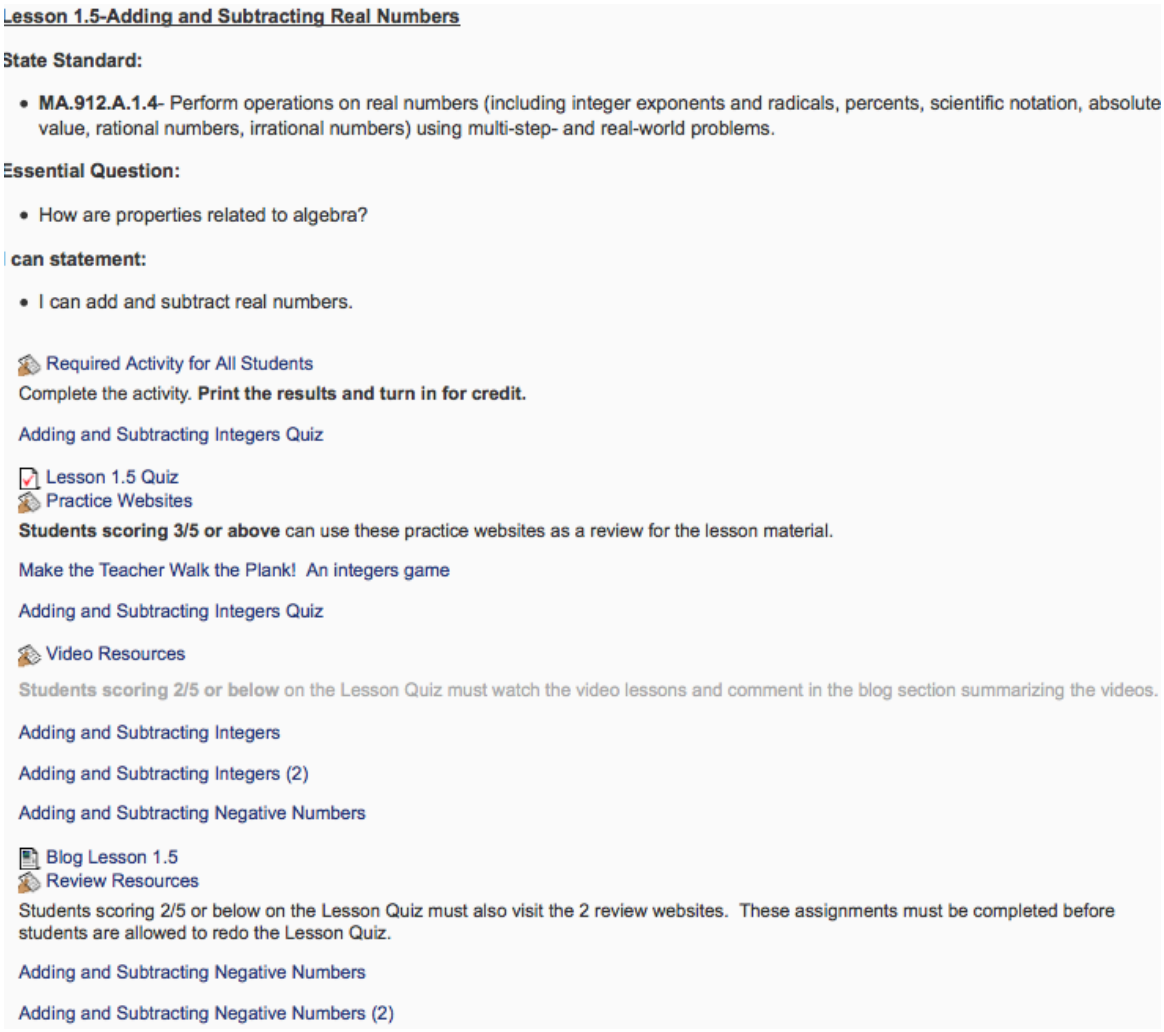


Figure 4-1. Screenshot of Algebra I Course

Table 4-1. Percentages of Log Events Occurring In and Out of School Hours in Algebra I

Month	Percentage of log events occurring during school hours	Percentage of log events occurring outside of school hours
August	17.9%	82.1%
September	91.8%	8.2%
October	57.8%	42.2%
November	60.0%	40.0%
December	86.3%	13.7%
January	0.0%	100.0%

The months with the most activity were September and December when chapter tests were given. Students accessing quiz/test activities accounted for 87.9% of all course activity in the first semester, supporting the assumption that the primary use of the online medium was for assessment purposes. Course views (viewing of the main course page) accounted for 11.4% of all course activity by students in the first semester. Students would have been required to access the main course page in order to take their lesson quizzes and chapter tests; if they achieved an adequate score then they would not have been required to visit the course until the next module and lesson quiz or chapter test. Log data indicates that, although the course was designed to use lesson quizzes as formative assessments and activities for remediation, students did not actually participate in the lesson quizzes in the modules. Instead, only four chapter tests or quizzes registered student attempts. Overall averages for these assessments were 69.3 (n=83), 70.5 (n=68), 58.1 (n=65), and 72.1 (n=66). Based on these averages and the limited amount of student activity in the course as a whole outside of the chapter tests, it is unclear if these tests were actually used as summative or formative assessments. Students were only allowed one attempt at each test so it was doubtful that it was used as a pre- and post-instruction measure. Because responses to some of the remediation activities were to be submitted through Google Docs, it was difficult to determine how many students, if any, were actually required to complete the review activities as those submissions were outside the LMS and were not recorded as log events.

Because students did not access the lesson quizzes, it was assumed that they were not enacted as designed.

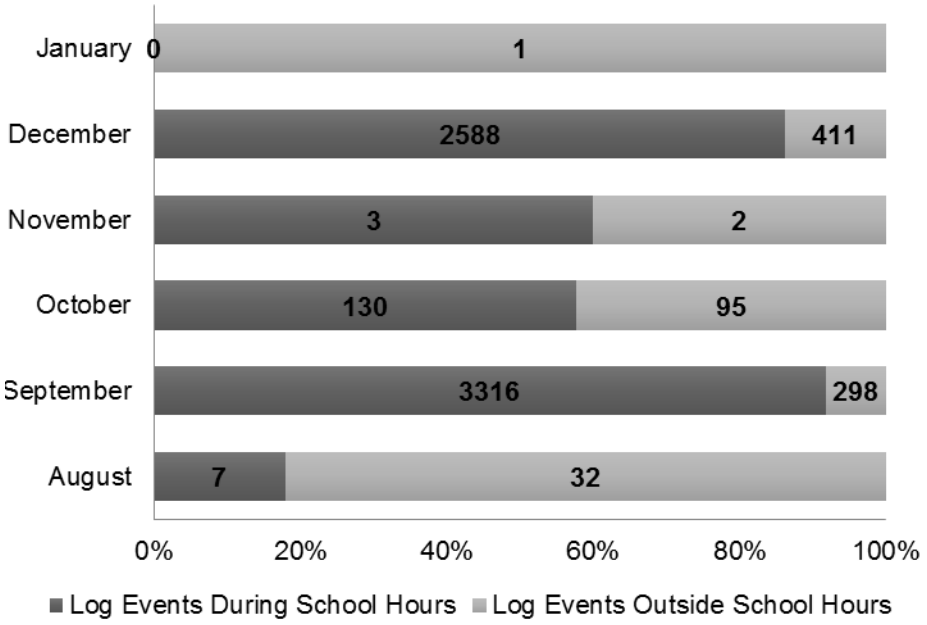


Figure 4-2. Number of Log Events In and Out of School Hours in Algebra I

While September and December had the most activity, in terms of the total number of log events in the course, the average number of log events per day, and the average number of log events per user, other months had significantly less activity. (Figure 4-2; Table 4-2). The higher numbers of log events in September and December could have been due to the fact that chapter tests were structured to display with one question per page; each click to a new question would register an additional log event thus inflating the number of log events. The varying numbers of users could indicate that the online tests were administered to some class periods but not others; the number of students per class period was not identified.

Table 4-2. Student Access of Algebra I Course

Month	Total Number of Log Events	Number of calendar days course accessed	Average number of log events per day	Total number of users	Average number of log events per user
August	39	11	3.55	82	0.04
September	3614	18	200.78	63	3.19
October	225	21	10.71	28	0.38
November	5	5	1.00	4	0.25
December	2999	11	272.64	52	5.24
January	1	1	1.00	1	1.00
Semester	6883	67	102.73		

Case Findings by Research Questions

This section will provide a review of the data for the Algebra I course as it relates to research questions (1), (2), and (3); research question (4) will be addressed in the next chapter.

Research Question 1. In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning? As the field of blended and online teaching and learning has evolved, standards for evidence-based practices have been developed by the International Association for K-12 Online Learning (iNACOL), including standards for quality online teaching (iNACOL, 2011a) and quality online and blended courses (iNACOL, 2011b). With regard to the iNACOL *Standards for Quality Online Courses, Version 2* (iNACOL, 2011b), the Algebra I course clearly demonstrated application of some benchmarks in *Section A: Content*, which covers such topics as to the rigor, depth, and breadth of course content and

assignments in addressing state and national content area standards, information literacy and communication skills, providing a clear introduction, setting a purpose for learning, and putting content into context. The goals and objectives were clearly stated (standard A.1), content was aligned to state content standards (standard A.2), and the breadth of assignments addressed the standards (standard A.3). However, instructional elements to support standard A.4, “information literacy and communication skills are incorporated and taught as an integral part of the curriculum;” A.6, “a clear, complete course overview and syllabus are included;” were not as clearly applied. With regard to standard A.6, no syllabus was provided and module introductions to put content into context were absent. The course also demonstrated use of the standards for *Section B: Instructional Design*, which covers the course design and organization of units or lessons, activities that engage students in active learning, accounting for and accommodating individual students’ needs, readability, varying kinds of interaction, and providing resources that enrich the course content. The Algebra I course demonstrated aspects described in the standards of Section B but showed weakness with standards B.3, “course instruction includes activities that engage students in active learning;” B.4, “provides students with multiple learning paths, based on student needs, that engage students in a variety of ways;” B.5, “provides opportunities for students to engage in higher-order thinking, critical reasoning activities and thinking in increasingly complex ways,” and B.10, “provides opportunities for appropriate instructor-student and student-student interaction.” Although assignments allowed students to demonstrate

understanding of how to solve equations, they weren't being asked to create anything new or show that they understood the meaning of concepts and why they are used to solve problems. Additionally, students were not given multiple paths to demonstrate their knowledge and were instead asked to solve and re-solve the same problems. The course also demonstrated implementation of benchmarks for *Section C: Student Assessment* and *Section D: Technology*, which includes features like course navigation, use of rich media, technological accessibility, and addressing copyright issues.

Research Question 2. What kinds of resources or activities are teachers putting in the online portion of their blended course? As previously discussed, the Algebra I course relied heavily on lesson quizzes and links to outside tutorials and math learning websites. These activities emphasized learning the procedure for solving equations with very little application and did not require the student to synthesize anything new. The lack of opportunities for students to actively engage with the content, with each other, and with the instructor in the online medium does not indicate a level of learning with technology as viewed from a constructivist perspective, "knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription" (Jonassen, Howland, Moore, & Marra, 2003, p. 15) but instead indicates a learning from technology approach.

Research Question 3. What does student activity within the LMS indicate about the purpose of the instructional materials? As previously discussed, there was virtually no student activity in the course other than course views and

chapter tests or quizzes. There was no indication that the activities the teacher had designed were implemented with students. As a result, it can be inferred that the course was not enacted as it was designed. A number of factors could have contributed to this, including the fact that the teacher was new to online and blended learning or it may have been the case that her students did not need the kind of assessment and remediation that she had designed. The scope of this research was limited such that it was not possible to interview the teacher to determine the reason for this disparity.

Case II. Biology I

Instructor Information

"Barbara" has been teaching high school science for fourteen years, the past ten of which have been at the profiled school. She holds a bachelor's degree in zoology, a master's degree in secondary science education, and a specialist's degree in teacher leadership. She is certified in Biology, Chemistry, and Earth-Space Science grades 6-12. Barbara has twenty-five computers in her classroom, giving her 1:1 availability. Last year, she began to use the LMS in her courses for formative and summative assessments, including state-required end-of-course exams. She also used it to store content online and post assignments but used it only minimally for learning activities in and out of the classroom. She has never taught a fully online course.

Course Overview

The first semester of the Biology I course was organized into units with approximately three weeks/modules each for a total of eleven modules. Each unit began with an introduction of one to two paragraphs and each weekly module

began with a statement of the learning goals for the module, “In week X of this unit, we will learn…” and the number of the related learning target(s) from the textbook. The first module of unit also had a downloadable PDF of the unit plan that contained essential questions and learning goals, subject area standards (state and Common Core), a list of key terms, relevant websites, and a calendar for assessments. Each module was structured with sections listing readings, in-class presentations, “What To Do Online”, additional practice online activities, and “What We Are Doing F2F”. Together these features set a clear purpose for learning, put the content in context, and provided a clear structure to follow.

The online activities for each module included linked videos on external websites and embedded podcast videos created by “Mr. Anderson”, a teacher who posts video podcasts online for other teachers to use; none of the video resources were captioned or had transcripts. The lack of captions or transcripts would present an accessibility problem for deaf or hard of hearing students although there was no indication that any such students were enrolled in the course. In addition to the videos, modules commonly had review quizzes and activities at Quia.com, a site that allows teachers to build customized online activities. Modules also commonly contained flashcard activities or review games for vocabulary terms at Quizlet.com, another website that allows users to create study materials, and simulations called “Gizmos” at explorelearning.com. Many worksheets, as well as study aids, in PDF format were available for students to download online and submit in class. Several modules required students to create a concept map using bubbl.us (a website that allows users to create

concept maps and download them as a jpg file) and submit it as an online assignment in the LMS. Other online activities included a disease research project and assignments that asked students to use a variety of websites to create a comic strip or cartoon drawing to illustrate a concept. These activities are indicative of online learning that incorporates higher-order thinking skills. There were no online activities that called for collaboration or cooperative learning; activities focused instead on independent work although notes for "What We Are Doing F2F" suggested that group work was taking place in the classroom. The first module for each unit included a self-assessment in Google forms that asked students to rate their understanding of each of the learning targets. The LMS quiz tool was used only for the first unit test.

Looking at a Module

In looking at the Biology I course, the fourth module, "Unit 2: Chemistry of Life Part One", was representative of the other modules in the course. As the first module in the unit, it began with the unit plan, a list of learning targets, assigned textbook readings, and the topic of the in-class presentation. For the online activities, students were asked to watch three podcast videos by "Mr. Anderson" on topics covered in the module. Students were asked to take notes as they viewed the videos. Students then played a "Who Wants to Be a Millionaire"-style game on Quia.com and took a quiz created by the teacher in Quia. The next activity consisted of viewing another podcast and completing a downloadable worksheet, but the activity was optional. Because the optional activity was put in as an embedded link and there was no space to submit it online, there was no log data available to determine if students completed it or not. After that, students

practiced related vocabulary terms at Quizlet.com. Finally, students created a concept map on matter using bubbl.us and uploaded their jpg file in the LMS. Face-to-face class time for the module included completion of a vocabulary self-assessment, “Rate My Words”, completion of a graphic organizer on the nature of matter, and several hands-on lab activities. The online activities described here focused on introducing new content information, on giving students different ways to review it and show their understanding, and on distributing downloadable course materials. Figure 4-3 is a screenshot of a representative module from the Biology I course.

Activity Logs

Based on quantitative analysis of the activity logs within the LMS, student activity during school hours, between 8:00 A.M. and 3:00 P.M., had a mean percentage of 58.1%, suggesting a roughly 60/40 split between in- and out-of-school access of course content and activities by students (Table 4-3). This suggested that, while many activities may have been teacher-directed during the face-to-face time, others allowed students “some element of student control over time, place, path, and/or pace” as described in Horn and Staker’s (2011, p. 3) definition of blended learning.

Activity was consistent throughout the first semester. Course views (viewing of the main course page) accounted for 51.7% of all course activity in the first semester; assignment views were 28.2% of the activity; assignment submissions/uploads were 9.9% of the first semester activity; and viewing of content resources and links accounted for a combined 8.2%.

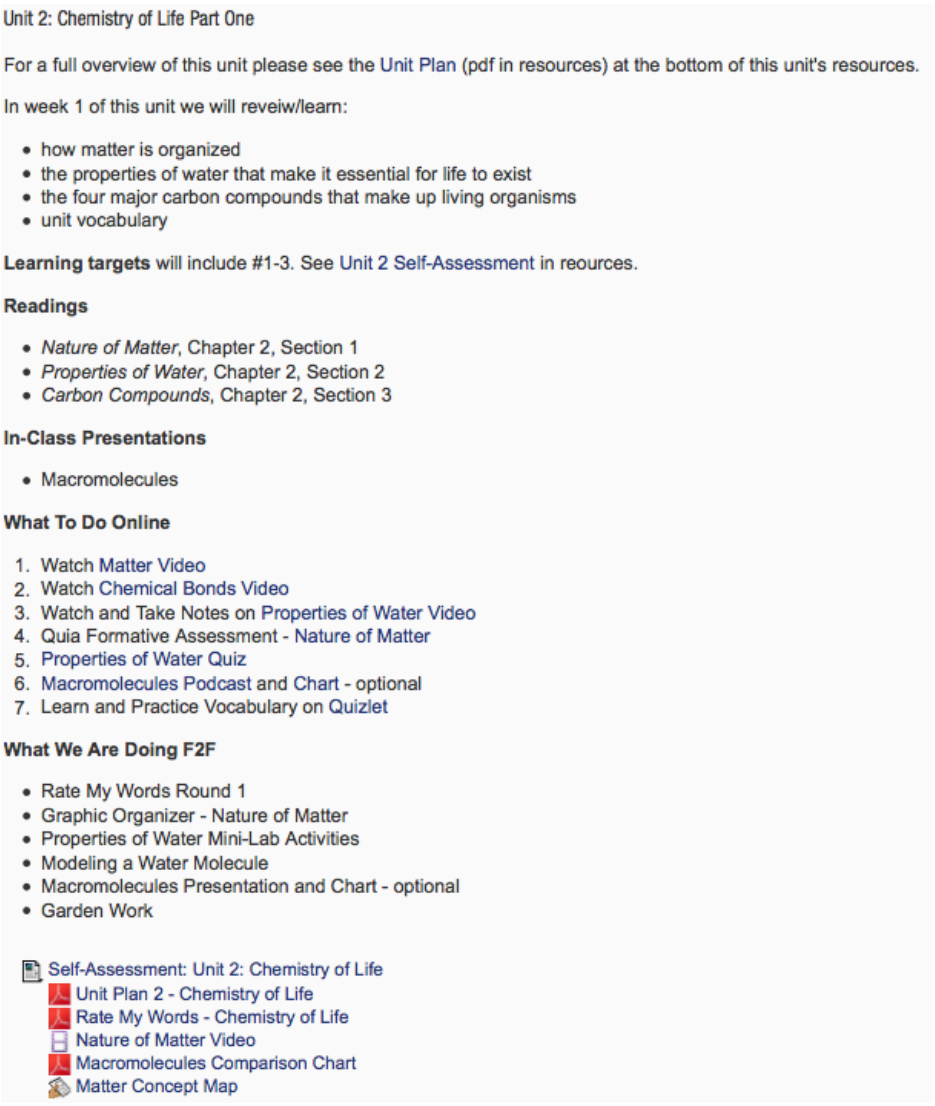


Figure 4-3. Screenshot of Biology I Course

Table 4-3. Percentages of Log Events Occurring In and Out of School Hours in Biology I

Month	Percentage of log events occurring during school hours	Percentage of log events occurring outside of school hours
August	30.0%	70.0%
September	69.8%	30.2%
October	67.0%	33.0%
November	58.5%	41.5%
December	63.4%	36.6%
January	59.9%	40.1%

The remaining 2.0% was split across forum activity, user views, and looking at recent activity. Whenever a student accesses the course, a “course view” log event is recorded so it is natural that course views would account for the highest percentage of activity. Together, assignment views and assignment submission pages accounted for 38% of the total activity while content resources were only 8.2%; this difference suggested that the online medium was being used more for distribution and collection of student work than for dissemination of content knowledge.

Activity log data showed that all of the links and resources provided were accessed by students, but since many of the activities were submitted using Google Docs or Google Forms, it is not possible to determine if, and how many, students completed all activities. Of the assignments that asked students to submit work within the LMS, four out of five registered student submissions.

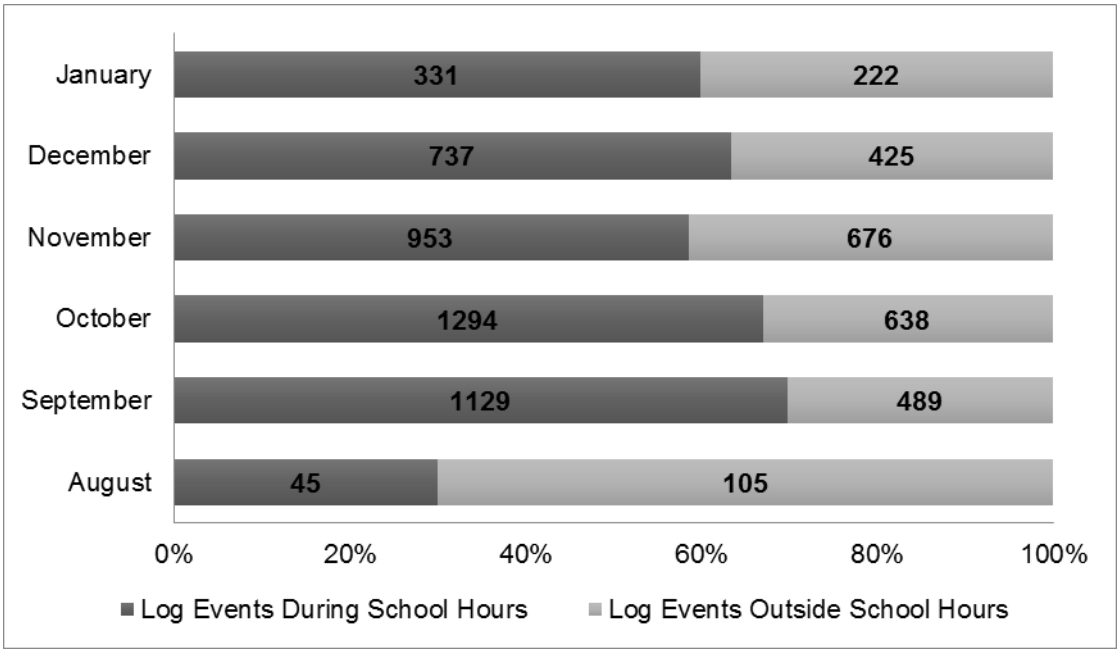


Figure 4-4. Number of Log Events In and Out of School Hours in Biology I

Activity in terms of the average number of log events per day and the average number of log events per user also remained consistent for each month of the first semester (Figure 4-4; Table 4.4). The consistency in the percentages of student access during, and outside of, school hours suggested a structured approach in how the LMS was used as an instructional tool and the role it played in how the course was delivered on a daily basis.

Table 4-4. Student Access of Biology I Course

Month	Total number of log events	Number of calendar days course accessed	Average number of log events per day	Total number of users	Average number of log events per user
August	150	12	12.50	49	3.06
September	1618	29	55.79	126	12.84
October	1932	31	62.32	126	15.33
November	1629	28	58.18	119	13.69
December	1162	23	50.52	93	12.50
January	553	12	46.08	108	5.12
Semester	7044	107	65.83		

Case Findings by Research Questions

This section will provide a review of the data for the Biology I course as it relates to research questions (1), (2), and (3); research question (4) will be addressed in the next chapter.

Research Question 1. In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning? With regard to the iNACOL *Standards for Quality Online Courses, Version 2* (iNACOL, 2011b), the Biology I course clearly demonstrated benchmarks in *Section A: Content*, which covers such topics as to the rigor,

depth, and breadth of course content and assignments in addressing the standards, information literacy and communication skills, providing a clear introduction, setting a purpose for learning, and putting content into context. Assignments were clearly related to the given objectives and introductions put content into context and set a clear purpose for learning. Opportunities to apply information literacy and communication skills (standard A.4) were included in writing activities as well as the assignments that called for students to represent what they had learned in an infographic, concept map, or cartoon. Where the Biology I course showed the best implementation of the iNACOL standards was in *Section B: Instructional Design*, which covers the course design and organization of units or lessons, activities that engage students in active learning, accounting for and accommodating individual students' needs, readability, varying kinds of interaction, and providing resources that enrich the course content. The course was highly organized, made clear distinctions between online and face-to-face activities and provided a wealth of embedded video resources and links to external websites. However, the course showed weaknesses in standards B.10, "provides opportunities for appropriate instructor-student and student-student interaction." Activities were focused on independent work and did not provide for collaboration or cooperative learning in the online medium. The course also demonstrated implementation of benchmarks for *Section C: Student Assessment*, using a variety of assignments to gauge student learning rather than formal tests or quizzes in the online medium, and *Section D: Technology*, except for D.10, "Course materials and activities are designed to

provide appropriate access to all students. The course, developed with universal design principles in mind, conforms to the U.S. Section 504 and Section 508 provisions for electronic and information technology as well as the W3C's Web Content Accessibility guidelines (WCAg 2.0)." As previously noted, none of the video resources in this course were captioned and all lacked transcripts.

Research Question 2. What kinds of resources or activities are teachers putting in the online portion of their blended course? As previously discussed, the Biology I course provided numerous video resources, downloadable study guides, and links to external websites. Assignments centered on individual work and gave students multiple opportunities to demonstrate what they had learned in different ways, using both traditional assignments and technology-based activities that incorporated higher-order thinking skills. While the video podcasts by "Mr. Anderson" provided detailed demonstrations and some online demonstration simulations were included, there was a missed opportunity for students to complete a simulation or virtual lab or to work together in a problem-based learning approach, especially with the 1:1 availability of computers for student use. From a constructivist perspective, the resources and activities in this course represent examples of both learning from technology and learning with technology, or ""knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription" (Jonassen, Howland, Moore, & Marra, 2003, p. 15).

Research Question 3. What does student activity within the LMS indicate about the purpose of the instructional materials? In general, the activities and

resources designed in the course were accessed and used by students, demonstrating that the course was enacted as designed. As previously discussed, percentages of access during school and non-school hours, average numbers of log events per day and per user, and numbers of log events per month were all consistent, showing that the content and activities in the online medium were integral to the design and delivery to the course as a whole during both face-to-face and online time. Log entries showed that students regularly accessed this course at all hours of the night, not just expected homework times, on weekends, and on holidays. The high percentage (51.7%) of course views could indicate that students looked to the LMS as a sort of syllabus or reference point for what was coming in the course or to review material already covered. The fact that 38% of all student activity was to view content resources indicates that the teacher planned to use the LMS as a means for content delivery and may have even used it in a flipped classroom approach to blended learning. A flipped classroom approach is one in which the face-to-face time is used for teacher-guided practice and hands-on activities and content and instruction is delivered online for students to view outside of school hours (Staker & Horn, 2012).

Case III. English I

Instructor Information

"Ellen" has been teaching for six years, the past five at the high school level in the profiled school. She holds a bachelor's degree in public relations, a master's in secondary English education, and is in the process of earning a specialist's degree in literacy and the arts. She is certified in English (grades 6-

12) with the English for Speakers of Other Languages certificate endorsement. She has been using blended learning as part of a unit-long writing partnership project for five years but is now applying it for all units in her course. Ellen has fifteen computers in her classroom for student use.

Course Overview

The online content in the English I course was arranged in quarterly unit modules, with two quarter/unit modules for the first semester. Both of the unit modules for the first semester began with an image related to the unit topic and a few sentences or quote to set the stage for the content and give a purpose for learning. For the first unit only there was a division given for what would generally take place in class as opposed to online; in class activities included time for students to read, write and discuss their work while online activities were focused more around giving and receiving feedback as part of an online writing partnership with a class of English education graduate students at a nearby university. Neither the course syllabus nor the introduction section identified specific learning objectives or Common Core or state standards covered by the unit's activities. Each unit had numerous links for PDFs of readings with links to some additional multimedia resources, each of which had a transcript for deaf or hard of hearing students. Activities within the LMS included discussion forums for peer writing feedback, use of the quiz tool for feedback from graduate student writing partners and for self-assessments, a wiki for a shared vocabulary list, and for submission of literary analysis worksheets and assignments.

Looking at a Module

The first unit module (Figure 4-5) began with the guiding question, “How do peoples’ experiences determine who they are?” The anchor text for the unit was the novel *To Kill a Mockingbird* by Harper Lee but additional readings were provided to practice literary analysis skills and explore themes introduced in the novel. A general division between online and in class activities was given. In class activities were: “Lessons on reading and writing; Time to read together and independently; Time to work on writing assignments and get help; What makes writing excellent? Discussions and your contributions; Poetry lessons; and Discussions of the literature” while online activities were listed as: Writing partnership – graduate student feedback; Writing partnership – peer feedback; Revision of personal narratives and literary analysis essays; Double-entry reading blog for *To Kill a Mockingbird*; Quizzes – reading quizzes, feedback quizzes, and personal assessment quizzes – where you report your personal progress; and Digital portfolios – where you publish your final drafts. Sections of the module were divided up into pages with links to resources and activities. For example, the page for *To Kill a Mockingbird* had a link to a full-text online version of the novel, a link to a 1930s photo response assignment, an audio reader’s guide at the National Endowment for the Arts, and links to quizzes for different chapters of the book. The section pages for poetry and short stories and nonfiction readings contained links to additional readings and assignments based on them. Pages for vocabulary, personal narratives, literary analysis, and student portfolios had links for assignments related to those areas. The student portfolios

were created using the online tool weebly.com that allows users to create a free website or blog.

The writing partnership in this course centered around the writing assignments where students had to write a personal narrative and a literary analysis essay. The writing and feedback process was three-pronged: the high school students received private feedback and mentoring from the graduate students using the assignment tools, the high school students provided feedback to each other using the discussion forums, and finally, the high school students reflected on their own work in an activity using the quiz tool. The high school students submitted their first, second, and third drafts using the advanced uploading of files tool in the LMS, which allowed their graduate student writing partners to view them and give feedback by using comments and tracking changes in students' Word documents and uploading them back to the LMS for students to view. Graduate student mentors were granted enrollment in the course as instructors in order to facilitate this process. The quiz tool was used for self-assessment in which students commented on the writing process as well as the usefulness of their graduate student writing partners' feedback. The teacher reviewed this self-assessment and feedback; it was unclear if it was shared with the graduate student writing partners.

Because this unit focused on literary analysis, the writing partnership, and reflective reading and writing, activities to promote and demonstrate higher-order thinking skills were prominent. Specific learning objectives were not identified but examples of students' work demonstrated a clear understanding of the activity

and what they had been asked to do, some even reflecting on their personal growth as a result of the activities, demonstrating metacognitive ability. Figure 4-5 is a screenshot of a representative module from the English I course.

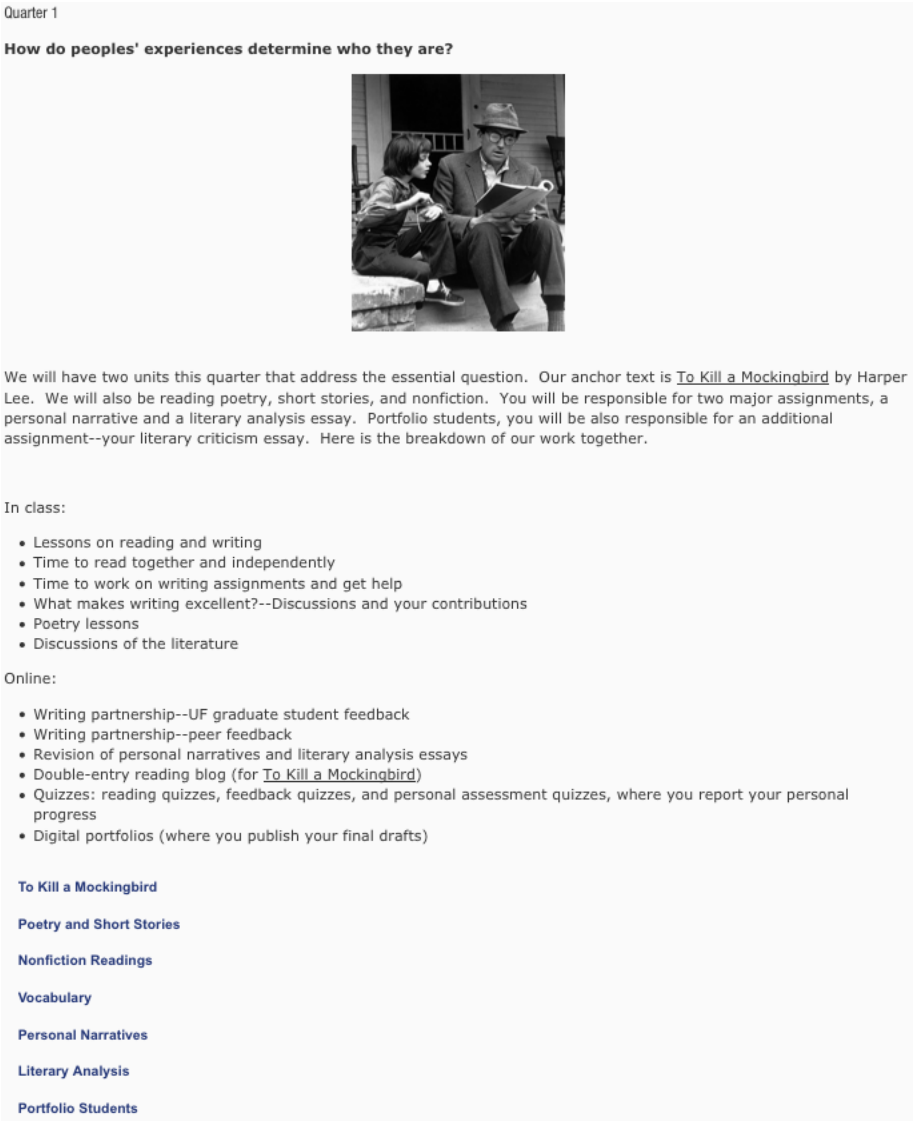


Figure 4-5. Screenshot of English I Course

Activity Logs

Based on quantitative analysis of the activity logs within the LMS, student activity during school hours, between 8:00 A.M. and 3:00 P.M., had a mean percentage of 78.1%, suggesting a roughly 80/20 split between in- and out-of-

school access of course content and activities by students (Table 4-5). The high percentage of activity during school hours would suggest that work in the online medium was largely teacher-directed and part of the face-to-face instructional time. The continual activity by students outside of school hours showed that students had “some element of student control over time, place, path, and/or pace” as described in Horn and Staker’s (2011, p. 3) definition of blended learning.

Table 4-5. Percentages of Log Events Occurring In and Out of School Hours in English I

Month	Percentage of log events occurring during school hours	Percentage of log events occurring outside of school hours
August	76.8%	23.7%
September	81.7%	18.3%
October	72.0%	28.0%
November	81.2%	18.8%
December	82.5%	17.5%
January	74.1%	25.9%

Activity was consistent throughout the first semester. Discussion forum activity accounted for 28.7% of all course activity in the first semester; course views (viewing of the main course page) accounted for 20.4% of all course activity in the first semester; quiz activity accounted for 14.8%; assignment views were 13.2% of the activity; assignment submissions/uploads were 4.1% of the first semester activity; and viewing of content resources and links accounted for a combined 16.1%. The remaining 2.7% was split across wiki use, user views, and looking at recent activity. Discussion forums, assignment submissions, and quizzes were all used as tools for the writing partnership, so it is natural that these would account for the most activity. The content resources that were

provided contributed to the writing prompts or served as resources for students to draw from. These resources were used 76.2% of the time during school hours which would suggest that were used as part of the face-to-face content instruction but were accessed by students writing during non-school hours. User views accounted for 2% of the total activity; it is surmisable that this could have been due to both high school students and graduate students wanting to know more about their writing partners.

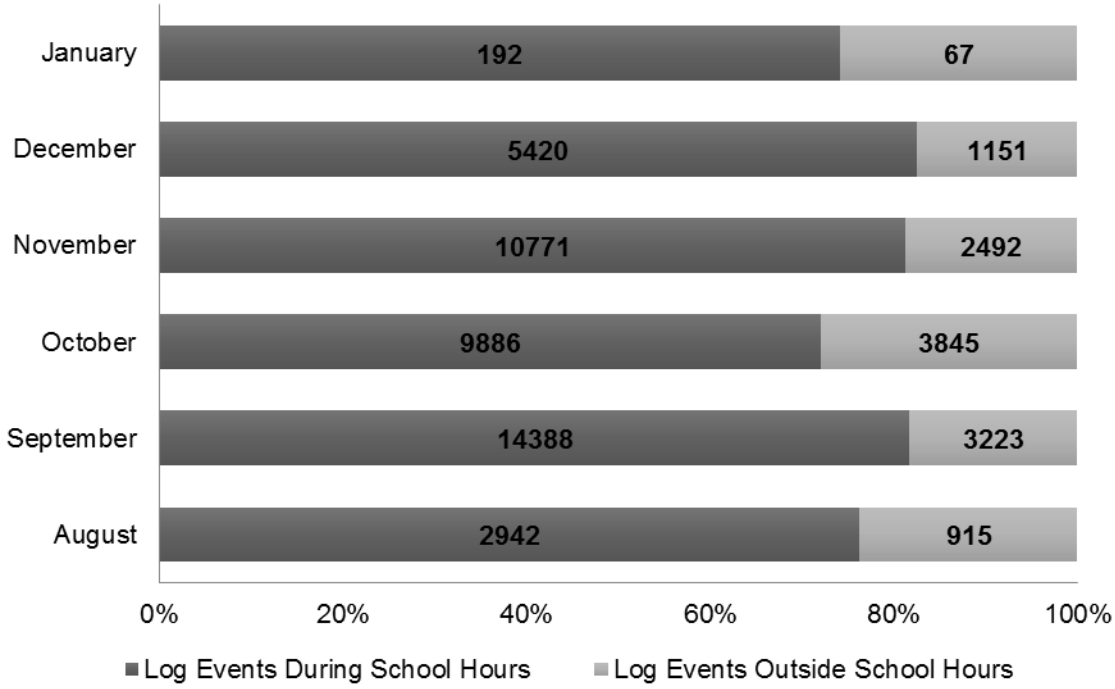


Figure 4-6. Number of Log Events In and Out of School Hours in English I

Activity in terms of the average number of log events per day and the average number of log events per user were highest during September, October, and November during the writing partnership with the graduate English education students (Figure 4-6; Table 4-6). The percentages of access during, and outside of, school hours could suggest that the online medium was designed and used as a structured part of daily instruction throughout the first semester.

Table 4-6. Student Access of English I Course

Month	Total number of log events	Number of calendar days course accessed	Average number of log events per day	Total number of users	Average number of log events per user
August	3857	12	321.42	116	33.25
September	17611	29	607.28	124	142.02
October	13731	31	442.94	121	113.48
November	13263	28	473.68	119	111.45
December	6571	21	312.91	119	55.22
January	259	11	23.55	67	3.87
Semester	55292	132	418.88		

Case Findings by Research Questions

This section will provide a review of the data for the English I course as it relates to research questions (1), (2), and (3); research question (4) will be addressed in the next chapter.

Research Question 1. In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning? With regard to the iNACOL *Standards for Quality Online Courses, Version 2* (iNACOL, 2011b), the online portion of the English I course demonstrated most benchmarks in *Section A: Content*, which covers such topics as to the rigor, depth, and breadth of course content and assignments in addressing the standards, information literacy and communication skills, providing a clear introduction, setting a purpose for learning, and putting content into context, with some weaknesses that may not have been apparent in the material in the LMS but may have been more apparent in the face-to-face course. For example, A.1, “goals and objectives clearly state what the

participants will know or be able to do at the end of the course. The goals and objectives are measureable in multiple ways" and A.2, "course content and assignments are aligned with the state's content standards, common core curriculum, or other accepted standards" were not fully evident because standards and learning objectives are not given in the LMS, but the activities and student artifacts suggested that standards were being followed. Standard A.6, "a clear, complete course overview and syllabus are included in the course" only applied to the first unit module. All standards for *Section B: Instructional Design*, which covers the course design and organization of units or lessons, activities that engage students in active learning, accounting for and accommodating individual students' needs, readability, varying kinds of interaction, and providing resources that enrich the course content, were demonstrated in the course as designed by the teacher. *Section C: Student Assessment*, and *Section D: Technology* standards were applied in the online portion of the course. Assessment in this course was both formative and summative and it appeared that students' work was scored using holistic rubrics, although none were available in the LMS. Based on the resources that were viewed in the analysis, included media were compliant with the W3C's web accessibility initiative (WAI) guidelines (http://www.w3.org/WAI/).

Research Question 2. What kinds of resources or activities are teachers putting in the online portion of their blended course? As previously discussed, the English I course used a variety of approaches to coach students through the writing process. The quiz tool was used for self-assessment, the assignments

tool was used to facilitate collaboration between the high school students and their graduate student writing partners, and the discussion forum tool was used for the high school students to provide feedback to each other. Additional resources were provided in the form of downloadable or linked readings, external websites, and multimedia resources. The nature of the activities aligned with an approach to level of learning with technology as viewed from a constructivist perspective, “knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription” (Jonassen, Howland, Moore, & Marra, 2003, p. 15) as opposed to an approach of learning from technology.

Research Question 3. What does student activity within the LMS indicate about the purpose of the instructional materials? As previously discussed, the majority of student activity (76.2%) occurred during school hours, suggesting that the online medium was an integral part of the face-to-face instructional time. Activities and resources in the course were all related to the stated objectives of helping students to develop literary analysis skills, become more reflective readers, and to develop their writing skills. Students accessed and actively participated in all activities, resources, and assignments (16/16) designed by the teacher in the LMS, clearly demonstrating that the course was enacted as designed. One possible explanation for this achievement could be that the teacher had more experience with online and blended learning and had been working to develop the writing partnership for five years.

Case IV. Health Opportunities through Physical Education (H.O.P.E.)

Instructor Information

"Helen" has been teaching high school health and physical education at the profiled school for eight years. She holds a bachelor's degree in health education and sports administration and is certified in health education (grades K-12) and physical education (grades K-12). This year is her first experience with online and blended learning; she is implementing a blended learning approach in her course mainly as part of the school's pilot of blended learning in the high school grades. She has fifteen computers in her classroom for student use.

Course Overview

The online content in the H.O.P.E. course was arranged in highly structured units, with some broken down into two parts, for a total of five modules in the first semester. Each module began with an embedded image to represent the purpose or content of the unit, gave the related chapter(s) in the textbook, and asked students to complete a self-assessment using Google Forms that asked students to rate themselves on the unit's learning targets using the following scale: (1) I have no idea, (2) I know some, (3) I know most, and (4) I mastered the idea. No indication was given as to what the teacher did with students' responses and they were not accessible for this research. Next, there was a list of outcomes that the unit would address, essential questions, a list of activities to complete online, a list of In Class activities, and a Resources area with links for files for students to download or links to discussion forums or assignment submissions. The essential questions focused on applying learning targets to the self, for example, "Why is it important to assess your health before starting a

fitness program?" and "How can you using the MyPlate.gov [tool] help build a healthy diet?" Along with the self-assessment, these essential questions set a clear purpose for learning. Although learning targets and essential questions were given, no specific state or national standards were given.

Online activities and resources among the modules varied. They included links for online videos, flashcards on Quizlet.com (for example: http://quizlet.com/13011160/chapter-3-and-4-flash-cards/), articles on WebMD.com or other health-related sites, downloadable handouts and worksheets in PDF form, quizzes within the LMS, use of the online text tool to complete "warm up" questions for review at the start of class, and submission of Workout Logs using the assignment tools within LMS. Multimedia resources had captions or transcripts available but embedded images did not have alt tags for screen reader accessibility. The discussion forums were used to summarize videos or to reflect on an issue such as tobacco use or alcoholism and apply it to decision-making or as a personal stress factor. In general, online activities within the course did not require higher-order thinking skills (for example, summarizing videos, answering simple Warm Up questions, or reviewing flashcards), but activities listed as "In Class" did (for example, setting personal goals and assessing progress towards them or synthesizing information to create custom menus).

Based on type of content and how it was presented, the primary purpose for online activities was to introduce and reinforce new concepts and to give students opportunities to reflect on the content and apply it their personal lives

and health. The LMS also served as a collection tool for weekly Workout Logs and smaller assignments. As a personal health and fitness course, the focus was on differentiation and application of concepts to the self; the pre- and post- self-assessments were designed to help students evaluate their current levels and focus on areas of improvement.

Looking at a Module

In looking at the H.O.P.E. course, the third module, “Unit 3 – Self-Esteem and Mental Health & Managing Stress and Coping with Loss,” was representative of the other modules in the course. It began with a pre-unit self-assessment in Google Forms, had students study flashcards on Quizlet.com, and asked students to read an online article at Helpguide.org on teen depression and write a brief summary, and then students took an open note quiz (also in Google Forms). The assessments in Google Forms were passworded so they were not accessible for research purposes. Next, students watched a video clip from CBS News about how the brain handles stress and responded to the following prompt in a discussion forum: “Identify three current situations in your life that can cause you stress. Discuss how you deal with it (i.e. exercise, acting, writing and etc.).” Then students took the post-unit self-assessment in Google Forms, read an article at WebMD.com on stress reduction techniques, summarized it, and participated in the following discussion:

> Read the Web MD article (http://www.webmd.com/balance/guide/blissing-out-10-relaxation-techniques-reduce-stress-spot) about Stress Reduction Techniques. Choose 3 Stress Reduction Techniques that you would consider using or have used in stressful points in your life. (1) Explain why you have chosen these techniques, (2) Why they would be effective for you individually, and (3) Think of particular

circumstances in your life that you would use these techniques. **If there is a technique that is not mentioned in the online article that you practice when you are stressed out. Feel free to discuss it.

In the Resources section were PDFs of guided notes for sections of the textbook chapter, but they were to be completed in class or for homework. Figure 4-7 is a screenshot of a representative module from the H.O.P.E. course. Activity Logs

Based on quantitative analysis of the activity logs within the LMS, student activity during school hours, between 8:00 A.M. and 3:00 P.M., had a mean percentage of 89.2%, suggesting a roughly 90/10 split between in- and out-of-school access of course content and activities by students (Table 4-7). This indicates that use of the online medium was primarily teacher-directed and used as a tool during the face-to-face time.

Table 4-7. Percentages of Log Events Occurring In and Out of School Hours in H.O.P.E.

Month	Percentage of log events occurring during school hours	Percentage of log events occurring outside of school hours
August	88.6%	11.4%
September	88.5%	11.5%
October	75.6%	24.4%
November	94.4%	5.6%
December	93.7%	6.3%
January	94.2%	5.8%

Activity in terms of access during and outside of school hours was consistent throughout the first semester. However, activity in terms of use and number of log events was highest in September and December when there were quizzes and more assignments due.

Unit 3 - Self-Esteem and Mental Health & Managing Stress and Coping with Loss

Unit 2 covers Chapters 3 and 4 of our text.

Part One:

Self-assessment on Unit 3 Learning Targets

Use the following scale to self-assess where you fall on each of the learning targets:

- 1 = I have no idea…
- 2 = I know some…
- 3 = I know most…
- 4 = I mastered the idea…

In Unit 2 we will address:

- Buidling Your Self-Esteem
- Using Good Communication
- Discussing Mental and Emotional Health
- Understanding Mental Disorders
- Descirbe different causes of stress
- Desribe the body's physical response to stress
- How we can deal with stress
- Name the stages of ten grieving process
- State seven warning sign of suicide.

Essential Questions:

- How can having high self-esteem can affect everything you do?
- Why can having good communication skills can prevent misunderstanding, build healthy relationships, and help express yourself appropriately?
- How can having good emotional health affect your mental health?
- How to look out for certain signs if a person might be suicidal so they can get help?

Online:

- Self-assessment pre unit
- Quizlet flashcards-Unit 3
- Read Depression Article (93 words)FCAs-Topic Sentence and 93 word summary
- Take Open Note Quiz
- Watch Video clip on stress and then participate in Discussion #1
- Self-assessment post unit
- Read Web MD article about Stress Reduction Techniques and then participate in Discussion #2

In Class:

- Fill in missing parts to Guided Notes of Unit 3
- "My Self-Esteem Collage"
- 10% summary on Depression article words.
- Watch Pscyhological Disorders youtube video (in class)
- Watch Cry for Help documentary (in class).
- Take Unit 3 Test (on paper)
- Review content
- Formative assessment-Section Reviews (on paper)

Figure 4-7. Screenshot of H.O.P.E Course

Course views (viewing of the main course page) accounted for 23.3% of all course activity in the first semester; quiz activity within the LMS was 36.1%; discussion forum activity was 26.3%; assignment views and submissions were 9.1% of the activity combined; viewing of content resources and links accounted for a combined 3.2%; user views accounted for 2.2%; and recent activity was a mere 0.1%. Within the discussion forums, 90.3% of the activity occurred during school hours. This is consistent with the 90/10 split in activity during school and non-school hours but it also suggested that the online medium played a key role in course discussion. It was unknown what the daily face-to-face routine was and if students were participating in online discussions synchronously or if they were participating in the online medium in rotation with other activities. The same applies to the quiz activity; 91.7% of activity occurred during school hours. The fact that students participated in activities both during and outside of school hours meets the Horn and Staker's (2011, p. 3) definition for blended learning, "content and instruction delivered in part online," but does not suggest that students had much "control over time, place, path, and/or pace." Activity in terms of the average number of log events per day and the average number of log events per user were also higher in September and December (Figure 4-8; Table 4-8). Despite significant differences in the number of log events per month and average number of log events per day, the percentages of access during school and non-school hours remained relatively consistent.

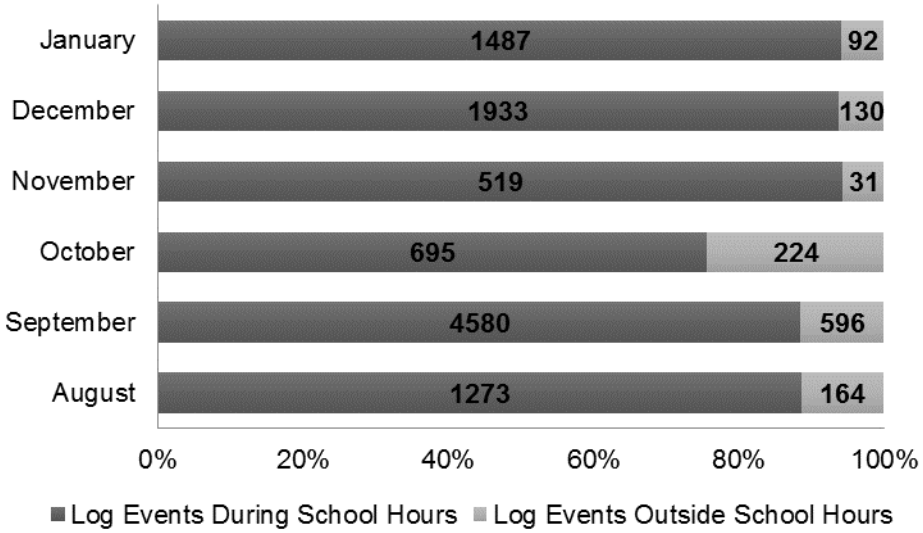


Figure 4-8. Number of Log Events In and Out of School Hours in H.O.P.E.

Table 4-8. Student Access of H.O.P.E. Course

Month	Total number of log events	Number of calendar days course accessed	Average number of log events per day	Total number of users	Average number of log events per user
August	1437	12	119.75	66	21.77
September	5176	24	215.67	70	73.94
October	919	24	38.29	64	14.36
November	550	13	42.31	64	8.59
December	2063	12	171.92	69	29.90
January	1579	8	197.38	66	23.92
Semester	11724	93	130.89		

Case Findings by Research Questions

This section will provide a review of the data for the H.O.P.E. course as it relates to research questions (1), (2), and (3); research question (4) will be addressed in the next chapter.

Research Question 1. In what ways do teachers enact blended teaching practices and standards following online professional development on blended

learning? With regard to the iNACOL *Standards for Quality Online Courses, Version 2* (iNACOL, 2011b), the H.O.P.E. course clearly demonstrated benchmarks in *Section A: Content*, which covers such topics as to the rigor, depth, and breadth of course content and assignments in addressing the standards, information literacy and communication skills, providing a clear introduction, setting a purpose for learning, and putting content into context. Although state or national standards were not given (standard A.2), essential questions and learning targets were provided to set a clear purpose for learning and connected the online content to what was being covered in the textbook. In terms of *Section B: Instructional Design*, which covers the course design and organization of units or lessons, activities that engage students in active learning, accounting for and accommodating individual students' needs, readability, varying kinds of interaction, and providing resources that enrich the course content, the H.O.P.E. course was clearly organized into units, engaged students in active learning as it asked them to apply and incorporate new concepts into their personal lifestyle, provided for student-student interaction as well as the face-to-face interaction with the teacher, and provided a wide variety of resources to enrich the content. Examples of standard B.5, "provides opportunities for students to engage in higher-order thinking, critical reasoning activities and thinking in increasingly complex ways" were not apparent in the online activities however the list of face-to-face activities suggests that this is addressed in class. How standards for *Section C: Student Assessment* were addressed was less clear because the pre- and post- assessments were in

Google forms so students' responses were not available for this research; the items included in them were geared towards informal assessment and personal reflection. Formal tests and quizzes were used in the course as summative assessments for material covered in the textbook and in class. Examination of one unit test showed a mix of essay items, multiple choice, matching, and true/false and revealed an average student score of 77.4% (n=63). Based on analysis of the resources and activities in the course, the structure used in the LMS and the included resources met the standards for *Section D: Technology*.

Research Question 2. What kinds of resources or activities are teachers putting in the online portion of their blended course? As previously discussed, the course included a mixture of quizzes, discussions, and assignment activities. Content resources included external websites with additional readings and videos. The purpose of the course was to help students increase their personal physical fitness, better understand personal health issues, reflect on their present lifestyle, and implement changes for a healthier life. While the resources and activities in the online portion of the blended course asked students to reflect and share their views on health issues, students were not asked to create anything new, collaborate with others, or do any kind of research and knowledge-building on their own. From a constructivist perspective, the course leaned toward an approach of learning from technology rather than one of learning with technology or "knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription" (Jonassen, Howland, Moore, & Marra, 2003, p. 15).

Research Question 3. What does student activity within the LMS indicate about the purpose of the instructional materials? In the H.O.P.E. course it should be noted that students only accessed and used three of the five modules in the first semester, so the course was not fully enacted as designed. However, it should also be noted that students accessed and participated in all but one of the activities and resources in the three modules used. As previously discussed, the majority of student activity took place during school hours and it can be inferred that the online medium was a regular part of the face-to-face instructional time. Because the teacher had only 15 computers for student use and an average of 89.2% of all online course activity took place during school hours, it could be surmised that the online medium was used as part of a rotation among activities within the course that included in-class vocabulary activities, presentations, workouts, and face-to-face group work. The course also included a statement that students were welcome to use personal devices such as laptops or smartphones within the course but it is unknown if students did use their own devices to access the online portion of the course during school hours. Course activity in the LMS was split between formal and informal assessments (36.1% of the activity in the LMS – activity in Google Forms could not be calculated), discussion forums (26.3%) that asked students to summarize what they had learned and apply it to their personal lifestyle, course views (23.2%), and content resources (3.2%). The higher percentages of quiz and discussion activity suggest that the teacher's purpose of using the LMS was more concentrated on assessment and course participation than on content delivery.

Summary

This chapter provided a description and discussion for each of the four cases in this multiple-case study. It addressed research questions (1) In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning; (2) What kinds of resources or activities are teachers putting in the online portion of their blended course; and (3) What does student activity within the LMS indicate about the purpose of the instructional materials? The next chapter will provide cross-case analysis and discussion and will focus on research question 4) How does the design and enactment of blended learning courses differ across the content areas?

CHAPTER 5
ANALYSIS ACROSS CASES

This study addressed the following research questions: (1) In what ways do teachers enact blended teaching practices and standards following online professional development on blended learning; (2) What kinds of resources or activities are teachers putting in the online portion of their blended course; (3) What does student activity within the LMS indicate about the purpose of the instructional materials; and (4) How does the design and enactment of blended learning courses differ across the content areas? To address these questions, a multiple case study was conducted to look at how four teachers in four different content areas (Algebra, Biology, English, and Health/Physical Education) designed the online portion of their blended courses and how those designs were enacted. The previous chapter profiled each case individually and provided discussion in each case for research questions (1-3). This chapter provides cross-case analysis and discussion to address research question (4), including discussion of similarities and differences among the cases in terms of how they demonstrated best practices based on standards for online and blended courses, how the courses were designed in terms of resources and activities, and student activity. I will also discuss differences in how the courses were designed and enacted, how the teachers approached learning and technology, and how they implemented blended learning as an approach.

Demonstration of the iNACOL Standards

Prior to designing their blended learning courses, the four teachers in this study participated in an online professional development course on blended

learning. As part of that course, they were required to review the International Association for K-12 Online Learning's (iNACOL) *Standards for Quality Online Courses, Version 2* (iNACOL, 2011b) and reflect on their readiness to meet each of the standards in their own teaching practice. The standards were used in the analysis of how the teachers designed the online portion of their blended courses. Some standards were not used in the analysis of the courses because they were more applicable to fully online courses than to blended learning courses. Appendix D is a complete list of the standards and Appendix E shows which of the selected standards were demonstrated, partially demonstrated, or not demonstrated in each course.

Content

Section A: Content of the iNACOL standards covers such topics as the rigor, depth, and breadth of course content and assignments in addressing state and national content area standards, information literacy and communication skills, providing a clear introduction, setting a purpose for learning, and putting content into context. In terms of academic content standards and assessments, the only course to greatly differ from the others was the English I course, which did not list learning objectives or provide state or national standards and also did not use traditional assessments. The H.O.P.E. course also did not provide state or national content standards but it did set a clear purpose for learning with learning goals and essential questions. With regard to the course overview and introduction, the Biology I, English I, and H.O.P.E. courses all provided some kind of introduction to the topic but the Algebra I course did not. The assignments in all four courses appeared to provide an appropriate level of challenge for

students at that grade level. Information literacy and communication skills were a key component in the English I course, were reinforced on a limited basis in the Biology I and H.O.P.E. courses, but were missing from the Algebra I course. As courses with a face-to-face component, it is not surprising that communication skills were not emphasized as much as they might be in a fully online course since teachers and students are able to communicate face-to-face and do not reply as much on written communication. While this difference is understandable, it should be noted that information literacy and communication skills are essential to be successful in an online environment and should be included in blended courses.

Instructional Design

Section B: Instructional Design of the iNACOL standards focuses on the course design and organization of units or lessons, activities that engage students in active learning, accounting for and accommodating individual students' needs, readability, varying kinds of interaction, and providing resources that enrich the course content. It is among these standards that the Algebra I course stood apart from the others. Because the online portion of the course was focused on assessment and remediation of previously taught skills, it did not demonstrate the same level of active learning, engagement, interaction, and use of higher-order thinking skills that the other courses did in their design and enactment. The H.O.P.E. course also did not overtly include activities for higher-order thinking skills but they were implied in the description of the face-to-face activities and the general theme of the course of applying concepts to the personal self to make lifestyle decisions. Higher-order thinking skills were

promoted in the Biology I course in an activity that asked students to create concept maps and another activity that asked them to conduct research. In the English I course, activities that encouraged higher-order thinking skills perhaps developed more naturally because the theme of the unit was literary analysis and writing. In terms of instructional and audience analysis, lesson design, appropriateness of content for reading level and the grade-level expectations, and availability resources to enrich the course content, all four courses clearly evidenced the standards, showing a clear understanding of students' needs and incorporating varied ways to learn and master the curriculum. With regard to student-student interaction, neither the Algebra I nor the Biology I courses included discussion forums in their design; the English I course used them for peer feedback on writing and the H.O.P.E. course used them for discussion of health issues. Other forms of student-student interaction such as group work or cooperative learning were absent from all four courses, although the English I course did have a page that linked to students' Weebly sites so they could view each other's work. In terms of student engagement in general, the Biology I and English I courses had the most consistent and frequent online use by students while activities in the Algebra I and H.O.P.E. courses were more teacher-directed and part of the face-to-face course. Of all the instructional design standards, the one least demonstrated across the four courses in general was B.3, "course instruction includes activities that engage students in active learning." The English I course came the closest to this ideal by asking students to interact with the content, relate it to their own lives, and to create original written works. For

teachers new to blended learning, this aspect may have seemed more natural in the face-to-face setting and more difficult to translate to the online medium.

Assessment

Section C: Assessment of the iNACOL standards focused on evaluation strategies and providing student feedback. Here the courses were more similar in terms of meeting the standards. The English I course, however, was the only one not to use traditional quizzes or tests and provided assessment and feedback through assignments and written comments on students' writing instead. It is unknown how the students' writing was assessed outside of the online medium. The Algebra I course was built around assessments of previously taught skills and activities that were prescribed based on students' quiz scores. The H.O.P.E. course used Google forms for an informal assessment at the beginning of each module that asked students to rate their pre-instructional understanding of concepts; it used the quiz tool for more traditional chapter tests. The Biology I course used a mix of assignments and traditional tests to assess students' understanding of material covered in the course. Despite their different methods, each of the four courses demonstrated student evaluation strategies consistent with course goals and objectives, appropriate means of assessment, and ongoing assessment over the course of the term.

Technology

Section D: Technology of the iNACOL standards covers course architecture, user interface, interoperability, accessibility, and data security. For the purpose of this study, only the standards related to user interface and accessibility were used. The other standards were deemed more appropriate for

a fully online course and did not apply to blended learning courses. All four courses had clear and consistent navigation and provided rich media in multiple formats. The Biology I course was the only course whose design did not meet accessibility standards for online content due to the inclusion of video podcasts that were rich in content but they did not contain captions and no transcripts were provided. While the courses were rich in media content and links to outside resources, there was very little original, teacher-created content in the courses. The four teachers also tended to use the same tools in similar ways, suggesting that their selection of tools or resources was related to prior technology training and experience. For example, the rather unusual use of Google forms across the courses indicates that the teachers may have had some specific training on using Google forms for assessment. The teachers also seemed to gravitate to outside tools such as Quia.com, which have a simpler-to-use interface than the equivalent tool in the LMS. It is unknown how much training each of the teachers had received in the use of the LMS.

Design of the Courses

Cross-case analysis showed differences between the courses in terms of course design, the selection of tools and resources, and the types of activities. Appendix F provides a complete chart of the tools, resource types, and activity types used by the four teachers in the design of the online portion of their blended learning courses.

Setting the Stage for Learning

In the design of the online portion of each blended course, all four courses were highly structured and organized into modules; the Algebra I course based

on lessons, the Biology I course based on units, the English I course based on quarters, and the H.O.P.E. course based on units broken into two parts. Using a consistent organizational structure throughout the course helps students to locate resources and to know what is expected of them.

Among the four courses, the structure within the modules varied. The Biology I, English I (only for the first quarter), and H.O.P.E. courses all had clear sections listing activities to be completed in class and those to be done online while the Algebra I course gave no indication of what was occurring in the face-to-face portion of the blended course. The Algebra I, Biology I, and H.O.P.E. courses were also organized very procedurally, listing activities and resources in an order to be followed, while the English I course separated resources by topic or theme, with a separate section for assignments.

The courses also differed in terms of the kind and length of introduction to the content provided for students. The introduction is a key part of a course or module because it sets the stage for students, letting them know what to expect and helping them to make connections to the content. The Biology I and H.O.P.E. courses gave a written introduction for each module that put the content into context, the English I course provided a written introduction in the first module but used an image with a guiding quote in the second, and the Algebra I course did not provide introductions.

Each of the courses set a clear purpose for learning in some way: the Algebra I course provided both objectives and related standards, the Biology I and H.O.P.E. courses gave objectives but not standards, and the English I

course set the purpose for learning in the written introduction but did not include learning objectives or related standards. The structure within the modules also varied. The Algebra I course gave no indication of what was occurring in the face-to-face portion of the blended course while the other three courses all had clear sections listing activities to be completed in class and those to be done online.

Resources and Activities

In all but the Biology I course, resources and external media were in compliance with the W3C's web accessibility initiative (WAI) guidelines. Podcast videos in the Biology I course were not captioned and did not have transcripts; however, there was also no evidence that a student in need of this accommodation was enrolled in the course. Each of the four courses provided numerous online resources with content information for students. All used some kind of video and/or audio media, provided online and downloadable readings, and had activities for students to complete both within and outside of the LMS.

Based on the kind of resources and the content of them, inferences were made about the instructional purpose of materials within the courses. The Biology I, English I, and H.O.P.E. courses all contained resources for the dissemination of both content information and procedural information while the Algebra I course did not as it focused on assessment and remediation. The Biology I and H.O.P.E. courses used the online medium to introduce new concepts or skills while the Algebra I and English I courses did not. All four courses contained resources for skills practice or review and assessment such as online review games, practice assignments, or video tutorials.

Resources and activities within the courses were analyzed and inferences were made about which instructional approaches were used in each course. Only the English I and H.O.P.E. courses included forums for group discussion or student-student interaction in the online medium. The English I course, with its writing partnership and peer feedback process, was the only one of the four courses to include collaborative or cooperative learning in the online portion of course. Based on the lists of activities to be completed in class, it is presumed that collaborative and cooperative learning kinds of activities were reserved for the face-to-face time in the other courses. All four courses included activities for independent skills practice such as assignments and online review games. Each of the courses, except for English I, had activities for direct instruction or lecture. The English I course provided a platform for the collaborative writing process and practice of literary analysis skills, but there was no direct lecture content on writing or reading critically. The Biology I and English I courses both contained activities that clearly promoted the use of higher-order thinking skills in the online medium. The Biology I course asked students to organize information they had learned into concept maps or cartoons that illustrated the concept. The English I course asked students to analyze what they had read and to synthesize new pieces as part of the writing partnership and literary analysis unit. All but the Biology I course had activities that explicitly provided for differentiated instruction although the activities within the Biology I course seemed like they could be adapted for students with different learning needs.

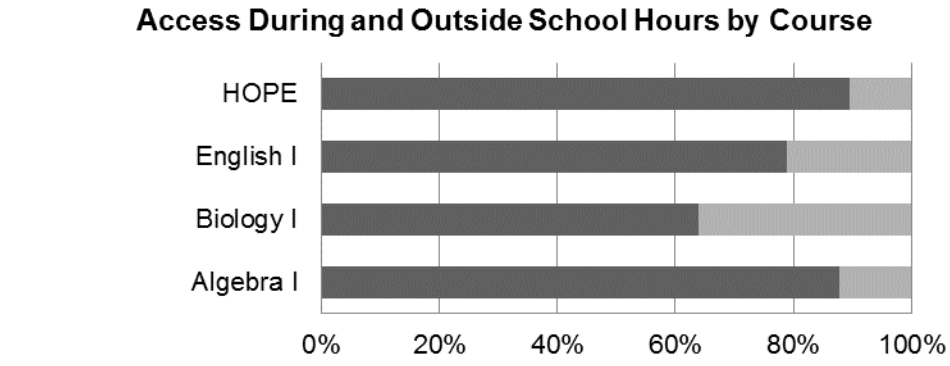
In designing their courses, each of the teachers used the tools and assignment types available in the LMS differently. All four courses included downloadable files and links to other websites and all but the H.O.P.E. course created their own content or resource pages using the page tool. Assignment types offered by the LMS include: assignment – uploading of files, assignment – online text, assignment – offline activity, discussion forum, quiz, wiki, and blog. The only assignment type used by all four courses was the quiz tool, which was the only of these tools used in the Algebra I course. The Biology I, English I, and H.O.P.E. courses all had students upload assignments and the English I and H.O.P.E. courses also had students enter text directly into the LMS; they were also the only two courses to use the discussion forums. The English I course was the only one to use the wiki tool and none used the blog tool although the Algebra I course had an assignment that it called a blog but was really an entry into a Google form.

Student Activity

Analysis of the activity logs within the LMS provided information about what resources and activities within the teachers' designs were actually used and when, either during school hours (8:00 A.M. to 3:00 P.M.) or outside of school hours (3:01 P.M. to 7:59 A.M.). In all four of the courses, the majority of log events occurred during school hours, suggesting that use of the online medium was teacher-driven and part of the face-to-face instructional time and activity. The Biology I course had the most activity outside of school hours with 36.2% of log events for the semester occurring outside of school hours while the H.O.P.E. course had the lowest percentage at 10.6%. The Algebra I course registered the

lowest number of log events outside of school hours at 839, which accounted for 12.2% of the course's activity for the first semester. The English I course had the highest number of total log events for the semester, 21.1% of which occurred outside of school hours. Compared to the other courses, the Biology I course gave students the most control over time, place, path, and/or pace, a hallmark of blended learning. The activity logs showed that the Biology course was accessed on more calendar days within the semester, including weekends and holidays. In using log activity as a metric for blendedness, it should be noted that a log event was generated each time a student clicked on a page within the course and the structure of activities could artificially inflate the total number of log events. For example, in the Algebra I course a chapter test was set up such that each question appeared on a separate page, causing students to click on more pages in order to complete the test. If this study were to be repeated, it is recommended that groups of clicks by each student in a unique activity be treated as a single log event. For example, if a student entered a quiz and clicked on 24 pages/questions, all 25 clicks or page views would be treated as a single log event. While it would take more time to discern this in the data, it would yield a more accurate picture of student activity when the data are used to compare how frequently a course or resource is accessed. However, the difference in percentages of access during school hours compared to outside of school hours is still an indicator of whether the online medium was used mainly as an in-class tool or if students were expected to participate in the course online outside of school hours. The Biology I and English I courses more clearly represent this

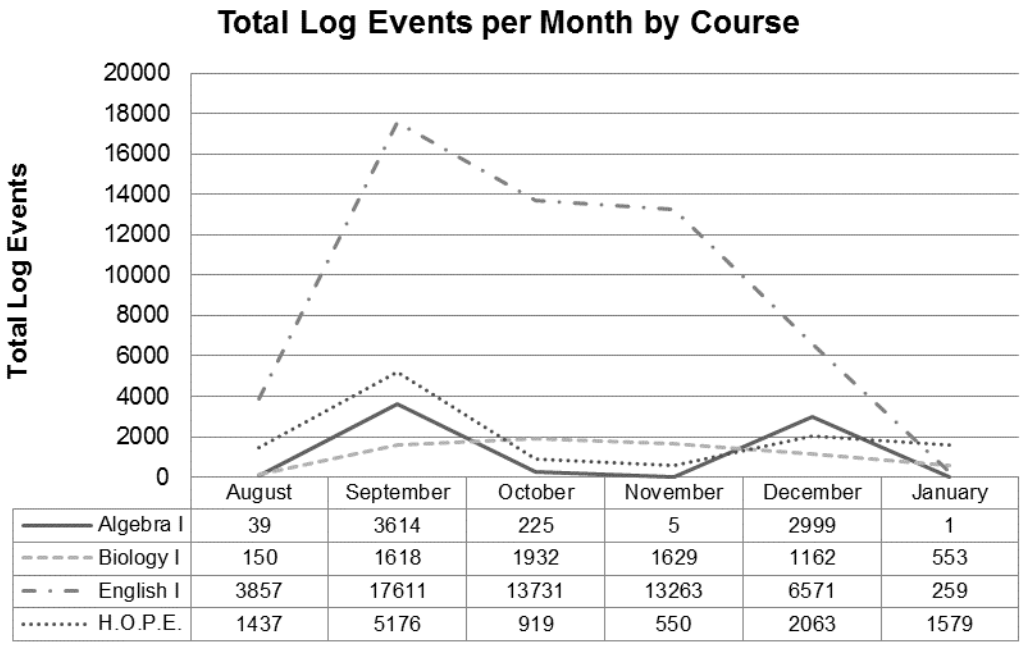
expectation than the Algebra I or H.O.P.E. courses. Figure 5-1 shows the total number of log events during and outside of school hours for each course.



	Algebra I	Biology I	English I	HOPE
Total log events during school hours	6044	4511	43599	10487
Total log events outside of school hours	839	2555	11693	1237

Figure 5-1. Access During and Outside School Hours by Course

Another difference in how each of the courses was accessed was in how many log events were registered each month. The English I course continually registered the most activity each month but the Biology I course was most consistent in the activity levels month-to-month. Both the Algebra I and H.O.P.E. courses showed spikes in activity in September and December, when chapter tests were given. Figure 5-2 shows the total log events per month for each course and creates a visual display of how consistently students accessed the LMS each month.



	August	September	October	November	December	January
Algebra I	39	3614	225	5	2999	1
Biology I	150	1618	1932	1629	1162	553
English I	3857	17611	13731	13263	6571	259
H.O.P.E.	1437	5176	919	550	2063	1579

Figure 5-2. Total Log Events per Month by Course

Design versus Enactment

Data from the activity logs in the LMS also provided indications of how the courses were enacted, that is, how they were actually used by students. The courses varied in the degree to which they were enacted as designed.

The Algebra I course was designed with lesson quizzes to identify which students needed remediation. Based on their quiz scores, students were to complete a number of online activities before retaking the lesson quiz. The activity logs, however, showed that the lesson quizzes and activities were not actually used by students and that the only activities from the online portion of the course that were used were the chapter tests. The course was designed with an emphasis on formative assessment and remediation but when enacted was used for summative assessment only. In the Algebra I course, the course was clearly not enacted as designed.

The Biology I course was designed with five unit modules in the first semester but only the first, second, third, and fifth modules were used although nearly all of the resources and activities in the used modules were accessed by students. The emphasis in the online portion of this course was on content delivery and assignment collection. The high percentage of course views (51.7%) suggests that students used the online medium as a sort of course calendar or syllabus to follow, a place to get assignment directions (28.2%), submit work (9.9%), and view content resources (8.2%). In the Biology I course, the evidence suggests that it was, for the most part, enacted as designed.

The English I course was the only course to have all activities and resources posted in the online portion of the course accessed by students. The course was designed around a writing partnership between students at the high school and a class of English Education graduate students from a nearby university. The course used the assignment tool to facilitate communication between the high school students and their graduate student writing partners, the discussion forums for peer feedback, and the quiz tool for self-assessment. The high traffic for each of the tools (discussion forums, 28.7%; quiz activity, 14.8%; assignment views and submissions, 17.3%) suggests that collaboration was taking place as designed. Within the LMS, activities were structured to support the collaboration rather than just to act as a pipeline or conduit for communication.

The nature of the H.O.P.E. course was to focus on students' individual personal fitness, to help them better understand health issues, to reflect on their

present lifestyle, and to implement positive changes. Activity logs showed that the online portion of the course was used 89.2% of the time during school hours, showing that its use was primarily teacher-driven and part of the face-to-face instructional time. Based on the information given about the face-to-face and online activities and the fact that the teacher had just fifteen computers for student use, it appeared that the online medium was used in rotation with other activities in the course such as workouts and presentations. The H.O.P.E. course was also the only one to include a statement that students were welcome to use personal devices such as laptops or smartphones within the course but it is unknown if students did use their own devices to access the online portion of the course during school hours. Activities in the online medium centered on content delivery and discussion of health issues. The nature of the discussions was for students to reflect on what they had learned and to discuss how it related to their personal lives. Only three of the five modules for the first semester were used, so while the activities that were used were used as intended, the course was not fully enacted as it was designed.

The path from design to enactment can be a long one with many obstacles in the way. Without interviewing the four teachers or observing their courses directly, it is difficult to know what challenges they faced in their foray into blended teaching and learning or how those challenges may have impacted the ways in which they enacted their designs. However, the log data of student activity provides clear indications of which activities and resources were used and which were not. Based on that log data, it has been inferred that the English

I course was enacted as designed, having used all of the activities and resources designed in the course. The Biology I course did not use every single item designed in the course, but activity logs indicated that the majority were used as intended. The H.O.P.E. course was designed with five modules but only three of them were enacted; all but one activity was used in the three enacted modules. Activity log data showed that the majority of activities in the Algebra I course were never accessed by students, implying that the course was not enacted as designed.

Learning from Technology versus Learning with Technology

A social constructivist approach to knowledge building served as a framework for this study. Analysis of each case looked for evidence of how the design and enactment of the blended learning course implemented the use of technology for instruction. Jonassen, Howland, Moore, and Marra (2003) describe an approach to learning with technology as “knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription” (p. 15) as opposed to one of learning from technology, or the assumption technology is a tool for delivering and communicating messages, that students comprehend those messages, and learn from them just as they would from listening to a teacher’s lecture (Jonassen, Howland, Moore, and Marra, 2003). Based on analysis of the contents of each course, inferences were made as to whether the course more represented learning from technology or learning with technology.

Each of the four courses included links to outside websites with readings, videos, and tutorials. How these web resources were used varied from course to

course. In the Algebra I course, students took a lesson quiz and then participated in online activities prescribed by their score on the quiz. These activities included watching video tutorials, playing online review games, and practice solving equations using online manipulatives. Of the four courses, the Algebra I course most represented an example of learning from technology. If viewed as a spectrum with learning from technology at the far right, the H.O.P.E. course is a shift to the left. The H.O.P.E. course used online videos and informational health websites to inform students about health issues. Based on their understanding of the topic, students were asked to reflect on how they could apply the information to their personal lifestyle and create a post in a discussion forum. Still, they were not asked to create anything new, collaborate with others, or do any kind of research and knowledge-building on their own. Moving toward the center of the spectrum, the Biology I course contained examples of both learning from technology and learning with technology. The course had a plethora of online resources for students that included video podcast lectures by “Mr. Anderson”, demonstration simulations, and games – all of which exemplify a replacement of teacher lecture with electronic presentation. However, the Biology I course also asked students to conduct online research on topics and to use online tools to construct concept maps or cartoons to demonstrate some aspect of the concepts learned, examples of learning with technology. At the left end of the spectrum is learning with technology. The English I course lies on this end of the spectrum. A wide variety of online readings and multimedia resources were included for students to refer to or use as inspiration for literary analysis writing assignments.

The high school students were matched with English Education graduate students in a writing partnership. In the course, the assignment tool was used to facilitate communication and collaboration between writing partners; the discussion forums were used for peer feedback; and the quiz tool was used for self-reflection throughout the writing process. At the end of the unit, students selected pieces of their work and compiled them into online portfolios using weebly.com, which also contained student-created pages about themselves. The English I course exemplified an approach of learning with technology by giving them opportunities to for knowledge building, conversation, articulation, and reflection. Figure 5-3 shows the courses relative to each other on a spectrum of learning and technology; Algebra I was less blended while English I was the most blended of the four courses with H.O.P.E. and Biology I falling in the middle of the spectrum. This spectrum is discussed further in Chapter Six.

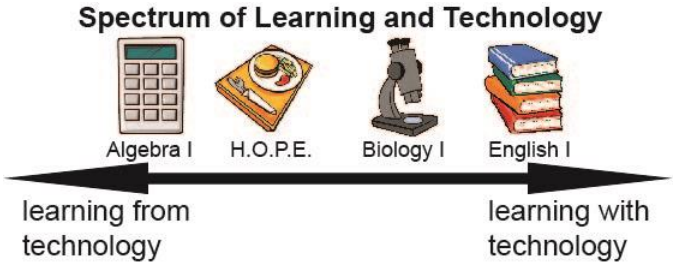


Figure 5-3. Spectrum of Learning and Technology

Without interviewing the teachers, it is impossible to know if the teachers made a conscious, philosophical choice relating to the “from” and “with” dichotomy. It is interesting to note, however, that teachers with more experience teaching in a blended learning format designed the courses that fell more on the learning with technology end of the spectrum.

Degrees of Blendedness

Based on the work of Horn and Staker (2011) the definition of blended learning used for this study was: education in which instruction and content are delivered in part through online delivery with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home. Horn and Staker use instruction and content as part of the definition to differentiate online learning from just the use of online tools for learning (Staker & Horn, 2012). Truly, blended learning is the effective integration of the online with the face-to-face such that the two modes are merged as complementary components of a single, blended approach (Garrison & Kanuka, 2004; Osguthorpe & Graham, 2003). Based on this view, the four courses profiled in the study could be judged to have different degrees of blendedness, or what Osguthorpe and Graham (2003) called “strengths of environment” (p. 229) along the continuum between face-to-face and fully online. A course with a greater degree of blendedness would be one in which the mix of online and face-to-face is the most integrated while a course with a lesser degree of blendedness would be one in which the online and face-to-face remain more separate and distinct. For example, in the English I course it would be more difficult to distinguish between purely online and purely face-to-face activities because the two are so integrated and students participate in the same activities at school and at home. As designed, the English I course could most easily be adapted as a fully online course. Closer to the face-to-face end of the spectrum are the H.O.P.E. and Algebra I courses that primarily utilized the online activities as part of the face-to-face instructional time.

Without interviewing the teachers, it is impossible to know for certain their view of the role of “blending” in the design of their overall course. This research only had access to the online portion of the blended courses and not to the face-to-face portion or to teachers’ lesson plans so it could not be determined how seamlessly was the integration of the online with the face-to-face. However, some inferences were made based on the design and ultimate enactment of the blended learning courses. The design of the Algebra I course, most of all, relied on online tools for assessment and remediation rather than active learning. When enacted, students did not ultimately use the tools and resources in the teacher’s design. The Biology I and H.O.P.E. courses clearly integrated the use of the LMS and the online portion of the course into the structure and routine of the face-to-face instructional time, that is, the online medium was used as a tool in the face-to-face portion of the course. The Biology I course, with its focus on content delivery and assignment collection, took on a flipped classroom approach, using the online time outside of school for students to view content resources in preparation for in-class activities. The structure of the H.O.P.E. course suggests that blended learning was implemented in the station rotation model wherein students rotated between online and other activities such as workouts and presentations within the contained classroom. Although the Biology I course had the most activity out of school hours, the English I course most fully integrated the online portion into the course and had the most active engagement and active learning by students. The Biology I and English I courses appeared to have come the closest to the ideal of effective integration and the bringing

together of online and face-to-face components into complementary cohesion. It is notable that both of these teachers had more experience with blended teaching: the English I teacher had been working to develop the online writing partnership for five years while the Biology I teacher had begun to implement blended activities in her course in the school year prior to this study. The difference in the degrees of blendedness among the courses could also be rooted in differences in the teachers' interpretations of the technology's value for teaching and learning and their view toward technology as a transformative agent (Hughes, 2005). Differences in the teachers' views on technology and on the role and benefits of taking a blended approach may also spawn from the differences in subject area culture, that is the normative practice of a specific content area, and some teachers may have been less comfortable implementing an approach that is outside the norms of their subject culture (Hew & Brush, 2006). For example, to take a facilitative rather than directive role in implementing technology in an Algebra classroom would break with the traditions of technology use in mathematics (Geiger, et al., 2012).

Summary

This chapter provided a discussion of the similarities and differences among the four courses in the multiple-case study. It addressed the similarities and differences among four blended learning courses in four different content areas (Algebra I, Biology I, English I, and Health/Physical Education) in terms of how they applied the iNACOL standards, how there were designed and the use of activities and resources, and student activity within the course. It also discussed differences in how the courses were designed and enacted, how they

approached learning and technology, and how they implemented blended learning as an approach. In general, each of the courses demonstrated the selected iNACOL standards for content, assessment, and technology but with regard to the standards for instructional design, the one least demonstrated was B.3, “course instruction includes activities that engage students in active learning.” The design of the courses differed in that the Algebra I course focused on remediation and assessment, the Biology I course focused on content delivery and collecting students’ work, the English I course focused on collaboration and creation, and the H.O.P.E. course focused on personal reflection and group discussion. In terms of enactment, the Algebra I course was not enacted as designed, the Biology I and H.O.P.E. courses were only partially enacted as designed, and the English I course was fully enacted as designed. The courses lined up relative to each other on a spectrum between learning from technology and learning with technology with the Algebra I course on the learning from end of the spectrum, the English I course on the learning with technology end of the spectrum and the Biology I and H.O.P.E. courses falling in the middle. The English I and Biology I course registered student activity on the most days and with the most consistent use; data for student activity in the Algebra I and H.O.P.E. courses may have been inflated by the structure of the activities and peaked with the offering of chapter tests. Inferences were made about each of the courses because this study did not include interviews with the teachers that would have rendered a more complete picture of each course, how they compared to each other, and the teachers’ views on technology.

The next chapter will present a review of the major findings, discuss the findings in relation to the literature, look at implications for the findings of this research to the field of K-12 online and blended learning, make recommendations for future research, and discuss final conclusions.

CHAPTER 6
CONCLUSIONS

This chapter presents a review of the major findings, discusses the findings in relation to the literature, looks at implications for the findings of this research with regard to the online professional development course, the profiled school, and the field of K-12 online and blended learning, makes recommendations for future research, and discusses final conclusions.

Overview of the Study

In recent years, there has been expansive growth in the field of online learning within K-12 settings (Watson, et al., 2011). While most programs, known as virtual schools, focus specifically on fully online courses; a growing number of schools and districts are implementing a blended learning approach, or the combination of face-to-face and online instruction. Compared to online learning, relatively little formal research has been conducted on blended learning (Gerbic, 2011), with most studies focusing on student engagement, efficacy, and models for delivery (Drysdale, Graham, Spring, & Halverson, 2013; Halverson, Graham, Spring, & Drysdale, 2012). The purpose of this study was to investigate the ways in which four K-12 teachers in four different content areas (Algebra I, Biology I, English I, and Health/Physical Education, also referred to as H.O.P.E.) designed their blended learning courses and how those courses were enacted. It paid particular attention to the following research questions: (1) In what ways do teachers enact blended teaching practices and standards following online professional development (PD) on blended learning; (2) What kinds of resources or activities are teachers putting in the online portion of their blended course; (3)

What does student activity within the LMS indicate about the purpose of the instructional materials; and (4) How does the design and enactment of blended learning courses differ across the content areas? To answer these questions, a multiple case study was conducted at a K-12 school in the southeastern United States. The four courses were part of a blended learning pilot program at the profiled school, and each course was treated as a separate case. All four teachers had participated in an online professional development course in blended learning in the summer. Data from the first semester of each course were analyzed for this study. To address the first and second research questions, content analysis of each course in the learning management system (LMS) was done, specifically looking at how the courses were designed and how they evidenced application of the International Association for K-12 Online Learning (iNACOL) *Standards for Quality Online Courses, Version 2* (2011) in the design and enactment. To address the third research question, quantitative analysis was done of student activity logs within the LMS. Finally, cross-case analysis was done to answer the fourth question, looking at how the design and enactment of blended learning varied across the courses.

Major Findings

The data for this study were collected from four courses in a K-12 school that was in Year One of a pilot program to implement blended learning across the high school grades. In the summer immediately preceding, all four of the profiled teachers participated in an 8-week online professional development (PD) course in blended learning. The course provided an overview of K-12 online learning, definitions for and models of blended learning, different types of activities and

tech tools, and examples of complete lesson plans with ideas for adapting them to a blended format. It also included an activity that asked participants to review the iNACOL standards and to reflect on and evaluate their own practices. This researcher was part of the team that developed the training and also served as the facilitator.

Although all four teachers participated in the same professional development course in blended learning, there were both similarities and differences in how each of the teachers in this study enacted blended learning practices. Similarities among the courses exhibited direct application of concepts presented in the PD course. The overall structure of each of the courses followed the structure modeled in the online PD course, although modules within the courses varied in scope with some built around a unit, some around a lesson, and some around a week. The courses were also similar in that, overall, they demonstrated implementation of the iNACOL standards, with the notable exception of standards for student-student and student-instructor interaction and activities to foster active learning. One activity in the PD course had asked teachers to reflect on the standards in relation to their then-current practice, enhancing their awareness of the standards as they prepared to design and develop their own courses. Student-student and student-instructor interaction and ideas for active learning in a blended environment were presented in the PD course but the short timeline did not allow for extensive exploration of these components. While there is much rich media available to enhance course content, it remains a challenge for teachers to embed the kinds of activities that

are essential for authentic learning in a content area, such as labs for science courses, in online or blended courses (Crippen, Archambault, & Kern, 2013).

Despite being aesthetically similar, the online portion of the courses varied in instructional focus with Algebra I seeming to focus on assessment and remediation, Biology I on content delivery and collecting students' work, English I on collaboration and creation, and H.O.P.E. on personal development and group discussion. In choosing resources and activities to include in their courses, all four teachers selected a variety of online materials that enriched the course content. Activities on sites outside the LMS generally fell into two categories: those for content delivery such as mini video lectures or tutorials and those for review such as interactive skills practice games or review quizzes on Quia.com. Student activity within the LMS indicated that activities in the online portion of the Algebra I and H.O.P.E. courses were largely teacher-directed and part of the face-to-face course while activity in the Biology I and English I courses was more consistent and split between in-school and out-of-school activity.

This study also found that the two teachers with blended teaching experience prior to the PD course or pilot year leaned more towards a greater degree of blendedness, learning with technology, enacting their courses as designed, and having more student activity and engagement than the two teachers with no prior blended teaching experience (Figures 6-1, 6-2, 6-3, and 6-4). While all four teachers had the same training and each followed the design principles presented in the PD course, this finding suggests that blended teaching experience was a factor in helping the teachers to enact their designs

and to use technology in more meaningful ways. Barbara, the Biology I teacher, and Ellen, the English I teacher, had some experience with blended teaching in their current courses in years previous to the pilot; Anne the Algebra I teacher had taught a university level course that was web-enhanced and used the LMS to collect assignments; and Helen, the H.O.P.E. teacher had no previous experience with online or blended learning as a student or as a teacher. Experience as an online learner has also been found to be a useful strategy for preparing online teachers; it helps them to make connections between their experiences as online learners and as online practitioners and it helps them to identify with online students (Muirhead, 2002; Wilson & Stacey, 2004). Helping teachers to gain experience as online or blended learners as well as online practitioners has implications for professional development in blended teaching and learning.

Discussion

Definitions of Blended Learning

The Sloan Consortium has suggested that blended courses should have between 30 percent and 79 percent of their content online (Watson, 2008; Allen & Seaman, 2013). By that definition only two of the four courses in this study would qualify as blended: Biology I and English I as they presented much of their content online while the Algebra I and H.O.P.E. courses were more activity-based and the online portion constituted a much smaller part of the overall course. Based on Horn and Staker's work (2011), this study used a broader definition: education in which instruction and content are delivered in part through online delivery with some element of student control over time, place, path,

and/or pace and at least in part at a supervised brick-and-mortar location away from home. By this definition, the Biology I, English I, and H.O.P.E. courses all qualify as blended courses because they gave students some control over time, place, path, and/or pace, and combined online and face-to-face instructional modalities. As enacted, the Algebra I course did not allow students that flexibility, and the online medium was utilized for instructional purposes only in the classroom under the teacher's direction. One way to look at this difference in how the courses were enacted is to view them on a spectrum of degrees of blendedness (Figure 6-1). Horn and Staker use "instruction and content" as part of the definition to differentiate online learning from just the use of online tools for learning (Staker & Horn, 2012). Truly, blended learning is the effective integration of the online with the face-to-face such that the two modes are merged as complementary components of a single, blended approach (Garrison & Kanuka, 2004; Osguthorpe & Graham, 2003). Figure 6-1 shows the four courses on a continuum between less blended and more blended relative to each other.

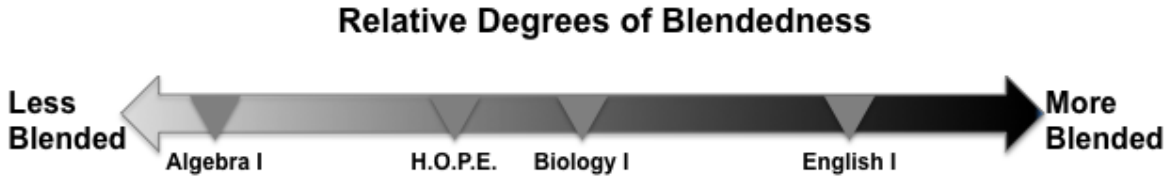


Figure 6-1. Relative Degrees of Blendedness

Placement in the continuum does not suggest that one course is superior to another or that one is blended and another is not; rather, it shows how they compare to each other in the degree of blendedness. Courses with a higher degree of blendedness could most easily be adapted into fully online courses.

Of the four content areas, English perhaps lends itself the most to adaptation to an online or blended format because it is more text-based while the other three content areas are more hands-on and activity-based in nature. The subject culture of English/Language Arts has also accepted technology as a tool for students in the writing process, including for collaboration and peer feedback, while other content areas have seen technology more as a tool for teachers in teacher-directed activities. In planning for the implementation of blended learning as a modality, teachers should consider how to adapt activities traditionally reserved for the classroom to an online environment. For example, students in a science course could complete lab activities in class (or outside of class using household items) and share their findings in a class wiki, using discussion forums to discuss their findings and collaboratively write up their conclusions. They could also conduct research together and collaboratively create a paper or presentation on a topic such as environmental issues. Students in a health course could track their workouts online and blog about their progress, or they could research health conditions or hazards and collaboratively create public service announcements or webpages, or plan a social media campaign aimed at other students, identifying resources of interest to other teens. Students in a math course could use virtual manipulatives to solve equations, use data gathered from online indices to calculate statistics and make predictions about current issues or events, discussing their findings online, or they could collect data from their community to use as variables for problems in class. Cloud computing and the use of applications such as Google Docs for group projects, peer assessment,

student-constructed presentations, class discussion, collaborative reflection, assisted writing, collaborative rubric construction, and website publishing can be used to promote constructivist cooperative learning (Denton, 2012). Teachers need PD in how to adapt activities and time to design lessons for their courses, particularly teachers in subjects that are less text-based, and where technology use is less a part of the subject culture, to support this kind of active learning.

Models of Blended Learning

How blended learning is delivered in K-12 settings varies. Staker and Horn (2012) identified four models for K-12 blended learning, including the rotation model, which encompasses station-rotation, lab-rotation, flipped-classroom, and individual-rotation. In the “station rotation” approach, students rotate within a given course among classroom-based modalities. In the “lab rotation” approach, students rotate within a given course among locations within a traditional school campus. In the “flipped classroom” approach, content and instruction is delivered online and teacher-guided practice takes place in the traditional classroom on a fixed schedule. The fact that content is primarily delivered online sets this approach apart from students merely doing assignments online outside of school. The “individual rotation” model is rotation within a given course or subject that is customized to individual students and may not require them to rotate to all available stations or modalities.

Each of the courses in this study fit into this paradigm. The H.O.P.E. course fit into the station rotation model as students rotated within the classroom between online activities using the classroom computers and other activities such as workouts. This might be explained by the fact that the H.O.P.E. teacher had

just fifteen computers for student use in her classroom and it appeared that the structure of the face-to-face course was already to rotate between activities; the online activities served as a new station in the regular rotation. The English I course was another example of station rotation; students alternated between online and teacher-led instruction with collaborative activities in both environments. Unlike the H.O.P.E. course, students in the English I course were regularly active in the online portion of the course outside of school hours. Given that the activity logs indicated that all students enrolled in the class were active in the online environment during the school day, and the fact that the English I teacher had just fifteen computers for student use, it appeared that she may have used the rotation as a means to facilitate conferencing and peer conferencing as part of the writing process. The Biology I course presented as an example of a flipped classroom approach, with students working in the online medium outside of school hours on a regular basis; the primary purpose of the online medium was for content delivery so that face-to-face classroom time could be used for hands-on activities. The Biology I teacher had twenty-five computers available for student use, giving her 1:1 availability and allowing for more students to participate in online activities at once, but the activity logs indicated that students largely accessed the lecture materials outside of the classroom. The Algebra I course fit the model of individual rotation, as not all students were required to participate in the online portion of the course, and the online medium was used as a tool for selective remediation. The Algebra I teacher also had fifteen

computers for student use. The lab rotation model was not represented in the findings of this study.

Although this study was situated at a single school in a single grade level, three different models of blended learning were present. In planning for the pilot implementation of blended learning at this school, a preferred model was not specified for teachers. They were presented with all four models in the online professional development course and directed to design their courses as they wished using the resources available. It is unknown if they purposely selected the model represented in their course and if it was by design or if enactment of the model was predicated by the number of classroom computers available. It may be that the model implemented corresponded to how they had used the available computers in their classrooms in the past, that is, teachers with fewer computers likely had students rotate in turns to use the computers while the teacher with more computers was able to conduct large group activities because she had more computers. In planning to implement a blended learning initiative, access to computers is an important consideration as is access to home computers or Internet-ready devices and reliable Internet service for students. The school in this study has extended after-school hours for the school library and computer lab, increasing opportunities for students without access at home to participate in online activities outside of class. Other schools seeking to implement a blended learning initiative should consider these factors and make a similar provision for students to have access to online resources.

Interaction

Research on blended learning in post-secondary settings indicates that a blended learning format has the potential to increase levels of student-instructor, student-student, and student-content interaction, factors that have been shown to contribute to student success (Anderson & Kuskis, 2007; Chen, 2012; Chen, Looi, & Tan, 2010) and promote higher order thinking skills (Shea, 2007; Chen, Looi, & Tan, 2010). In this study of K-12 blended learning, student-instructor and student-student interaction in the online environment were largely absent. The English I course was built around a writing partnership between the students and a class of English Education graduate students who acted as mentors to the high school students. The course relied heavily on communication and collaboration between the high school students and the graduate students, who, in effect, acted as instructors. This was the only of the four courses to exhibit student-instructor communication within the online environment. In terms of student-student interaction, the English I course used discussion forums as a means for peer feedback on written work while the H.O.P.E. course used forums to discuss health issues and how they might apply to students' personal lifestyles. The English I course also provided links to students' portfolio sites on Weebly.com, but this research was unable to determine if, or how often, students viewed each other's Weebly pages. Overall, there was very little student-student interaction and engagement within the online portion of the courses. Given that the blended learning format offers so much flexibility in how and when students communicate, this was a missed opportunity for students to engage with each other and the content beyond the regular classroom discussion. It could be that the teachers

felt in-class discussion was more valuable, more productive, or that they were better able to monitor students' understanding through face-to-face discussion. This aspect could be better understood through teacher interviews or classroom observations.

Given that English/Language Arts is largely a text-based subject area, discussion and collaboration among students in written format are a natural fit. For other courses, more effort must be made to encourage student-student interaction. As previously suggested, students can work together collaboratively using wikis, blogs, shared files, free cloud-based applications such as Prezi or Google Docs, and discussion forums. Instead of passively viewing or clicking through teacher-made activities, students could create activities or presentations for each other or as one group for another. These kinds of activities and interaction also promote critical thinking skills and give students opportunities to analyze, evaluate, and synthesize information. Approaches for increasing interaction in the online portion of blended courses should be a key point emphasized in teacher professional development on blended learning.

Student Activity

Student-student interaction is just one aspect of student activity in a blended course. Students should interact with the instructor, each other, and the content in both the face-to-face and online portions of a course. This study analyzed student activity logs from the LMS to investigate what student activity in the LMS could indicate about the purpose of instructional materials. One finding was that the Biology I and English I courses had more consistent activity, that is students logging into the online portion of the course and accessing activities and

resources, than the H.O.P.E. or Algebra I courses. Figure 6-2 shows student activity in the courses relative to each other.

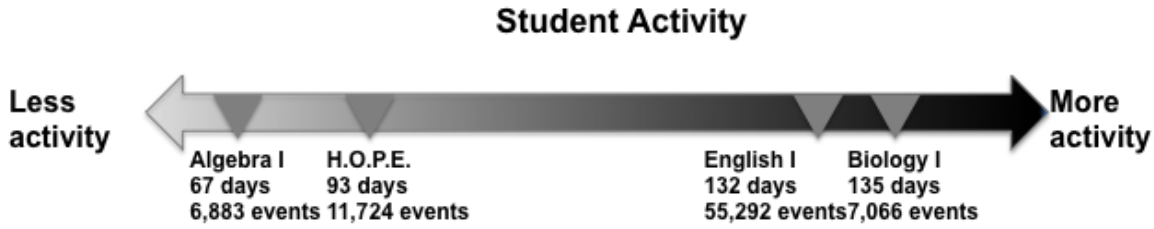


Figure 6-2. Student Activity

The Biology I course used the online medium for content delivery throughout the semester, causing students to log in on a more regular basis. Although the Biology I course did not have the highest number of log events, it did have activity on the most days. While log events do suggest student activity, they actually represent clicks to open webpages within the course and may be artificially inflated due to the design of some activities. The Biology I and English I courses contained more content material and required students to access resources on a more regular basis, causing them to have more student activity and a greater degree of blendedness.

In the evaluation of blended learning courses, student activity within the LMS could be used as a metric for enactment. Activity log data shows which activities and resources students accessed as well as the dates and times they were accessed, or not. This study found that the English I and Biology I courses were enacted mostly as designed. In the H.O.P.E. course, not all modules were enacted, but students accessed all of the activities and resources in the modules

that were enacted. In the Algebra I course, students accessed only the chapter quizzes or tests and not the activities and resources designed in the course. Figure 6-3 shows the four courses relative to each other on a spectrum on enactment. Figure 6-3 is meant to be descriptive and not evaluative; this research was unable to more closely investigate reasons why one teacher's design may have been more fully enacted than another's.

Figure 6-3. Enactment of Design

It is not uncommon in K-12 courses for teachers to be unable to enact all lessons as they planned. Interruptions such as special activities and standardized testing may prevent them from covering all the content in their curriculum. Students' progress and needs as learners may also impact the pace and direction of instruction. In the case of the Algebra I course, the online portion of the course was focused on remediation – something that may not have been needed and so was not enacted. In the Algebra I course, students are required to take state online end-of-course exams so the use of the online chapter quizzes and tests may also have been a means of preparing students for the state assessment. For a course to be truly blended, the online portion of the course should be integrated with the course curriculum and made a part of all aspects of instruction. Integrating blended learning into all aspects of the teaching and

learning process should be another focus in teacher professional development on blended learning.

Learning and Technology

Constructivism was the theoretical framework for this study and the lens through which the courses were analyzed. This study took the view that the online portion of a blended course is a *tool* for students to learn with technology rather than from technology. The structure of online and blended courses promotes the use of technology to engage learners in active and intentional learning activities that are learner-centered (Jonassen, Howland, Moore, & Marra, 2003). To be an effective online or blended learner, students must be able to experiment with technology which leads to "knowledge construction, not reproduction; conversation, not reception; articulation, not repetition; collaboration, not competition; and reflection, not prescription" (p. 15), the hallmarks of constructivist learning with technology (Jonassen, Howland, Moore, & Marra, 2003). Figure 6-4 places the four courses on a spectrum between learning from technology and learning with it. Computers in education have long been used for drills and skills practice in mathematics, a tradition of learning from technology, while they have been traditionally used as a tool in English/Language arts to create things with technology. Given this heritage and a conditioned view of how technology fits into either discipline, it is not surprising that the English I and Algebra I courses in this study fell at opposite ends of the continuum. The English I, Biology I, and H.O.P.E. courses each exhibited characteristics of constructivist learning in different ways while the Algebra I course fell into the traditional paradigm of learning from technology in mathematics. The differences

in how technology was integrated into each of these content areas may be due to differences in subject culture, or the general practices and expectations among practitioners in a specific school subject area. Teachers may be reluctant to adopt a technology that is outside the norms of practice in their subject culture (Hew & Brush, 2006). Within the subject culture of mathematics, technology integration has been restricted to lesson introductions and teacher-led activities, but the use of technology for collaborative teaching and learning is growing (Geiger, et al., 2012).

Figure 6-4. Learning and Technology

The English I course used technology as a tool to facilitate the writing partnership and collaboration as students created essays of literary analysis, giving them opportunities for knowledge construction, conversation, articulation, collaboration, and reflection. The Biology I course incorporated several video podcast lectures (reception) but did not give students opportunities to discuss them (conversation) in the online medium but did give them opportunities to articulate and reflect on what they had learned through the creative concept maps and cartoons. The H.O.P.E. course used discussion forums for students to reflect on what they had learned about health issues, to discuss them, and to apply them to their own lives but did not provide opportunities for collaboration.

Relative to the other courses, the Algebra I course, as designed, fell at the learning from technology end of the spectrum. More than the others it exemplified reproduction of skills, reception through tutorials, and prescription of activities based on assessment scores. The Biology I, H.O.P.E., and Algebra I courses were largely teacher-driven. Jonassen et al. suggest that for students to learn with technology, teachers must shift to a more facilitative than directive role. Algebra, and mathematics in general, has traditionally been a more teacher-driven discipline than English/Language Arts, which are more creative in their very nature. For content areas that are traditionally teacher-centered and lecture-driven, it may be more difficult for teachers to step aside and take on the role of facilitator rather than director, something that may defy the norms of their subject culture.

Implications for the Blended Learning Professional Development Course

The online professional development course on blended learning that preceded this study used Mishra and Koehler's Technological Pedagogical Content Knowledge (TPACK) (2006) model as a theoretical framework. In the course the teachers were presented with information about TPACK in order to help them recognize and reflect on their own technological, pedagogical, and content knowledge as teachers and how those domains overlap (Appendix C). One of the objectives from the course was for teachers to apply the five steps of the TPACK process to make decisions about integrating technology into a lesson plan. This is a complex process but it can be simplified into five basic steps (Harris & Hofer, 2009). These steps are:

- Choosing learning goals

- Making practical pedagogical decisions about the nature of the learning experience
- Selecting and sequencing appropriate activity types to combine to form the learning experience
- Selecting formative and summative assessment strategies that will reveal what and how well students are learning
- Selecting tools and resources that will best help students to benefit from the learning experience being planned

Based on these steps, content in the professional development course emphasized identifying content-specific learning goals, pedagogical approaches, strategies for modifying activities to a blended format, and how to teach with technology rather than focusing on specific tools for specific activities.

Based on the findings of this study, formal evaluation of the PD course should be conducted to assess how effectively it achieves its stated objectives. Evaluation should be done of impact on teacher practice and if more emphasis should be placed on approaches to active and collaborative learning activities with more examples of how technology can support that. In the PD course, teachers were encouraged to apply concepts and technologies to their own content areas but differences in application in different content areas were not made explicit. A recommendation would be for additional information to be included that demonstrated how principles and tools can be applied differently in different content areas, a recommendation found in the literature on technology-integration teacher professional development (Lawless & Pellegrino, 2007).

While the most commonly used PD evaluation technique is to simply survey participating teachers, this approach does not gauge impact on program outcomes or teachers' pedagogical change (Lawless & Pellegrino, 2007).

Kirkpatrick's (1959) Levels of Evaluation for professional development would provide a framework for evaluating the PD course. Kirkpatrick's four levels are: reaction, learning, behavior, and results. Reaction refers to how participants felt about the PD course; learning refers to any increase in knowledge or skills, behavior refers to the transfer of knowledge or skills to participants' work; and results refers to the outcome of the PD course in impacting teacher practice. This approach to evaluating professional development is also known as the KAB method: knowledge, attitudes, and behaviors (Lawless & Pellegrino, 2007). In future offerings of the course, data should be collected from a variety of sources to assess the effectiveness of the PD course in meeting program outcomes and impacting teachers' practice. Participant interviews could be conducted to determine their reaction and satisfaction with the PD course. Teacher lesson plans and other artifacts of teachers' practice can serve as proxies that represent a teachers' "knowledge-in-practice" (Cochran-Smith & Lytle, 1999, p. 262), that is, their professional knowledge as it applies to their teaching practice. Investigation of both face-to-face and online components of their courses, interviews with students, and student achievement data could be used to assess impact on program outcomes.

The professional development course in blended learning was initially meant to be offered in a blended format, but, due to a number of circumstances, it had to be offered in a fully online format. On-the-ground support and interaction was provided, making it somewhat blended and ongoing, but the main activity and interaction was online. If the course were expanded and offered in a blended

format, it might better be able to model blended teaching practices that promote higher thinking skills and active learning. Teacher technology PD in a blended format can help to not only expose teachers to new technologies, but can also support inquiry-based, content-focused activities within the formation of a learning community, helping teachers to be more reflective and to more effectively integrate technology into their teaching (Holmes, Polhemus, & Jennings, 2005).

In summary, recommendations for the professional development course on blended learning are to:

- Conduct a formal evaluation of the course to determine how well it achieves its stated outcomes;
- Collect more data from the next offering of the course;
- Include additional information that demonstrates how principles and tools can be applied differently in different content areas;
- Emphasize the importance of interaction and engagement, active learning, and higher order thinking skills; and to
- Offer it in a blended format to better model blended *learning* practices where the emphasis may previously have been on blended *teaching*.

Implications for the Profiled School

Timing is another factor related to the delivery of the online professional development course and the initiation of the blended learning pilot program at the profiled school. The professional development course took place from May to July, leaving teachers a very short time to plan and design their blended learning courses before the start of the school year in August. For the teachers who were developing their blended courses from scratch, the truncated planning time may have been a factor in the selection of tools and activities that they were already

more familiar with, or perhaps had had training with, such as the use of Google forms to collect information from students, the use of Quia.com for interactive quizzes, and the use of electronic resources provided by the textbook publishers. In preparation for Years Two-Five of the blended learning pilot at the profiled school, consideration should be given to presenting the course earlier in the year to allow participating teachers more time to plan and design their blended learning courses. It is understood that this may not be possible due to restrictions in the school calendar, so the PD course modules could be broken down into modules spread over more weeks, but requiring less work in each week. If the online PD course was offered in a blended format within the school earlier in the calendar year and then to extend through the first semester of the teachers' blended teaching practice, it would have what Matzat (2013) calls a "high level of embeddedness" (p. 41) in that the offline interaction of the teachers within the school would contribute to participation in the online environment.

As more teachers in the school gain more experience with blended teaching and learning, another recommendation would be to pair teachers coming into the pilot with more experienced mentors. Teacher-mentors should possess content knowledge expertise, strong communication skills, and have experience both as online learners and online or blended instructors (Muirhead, 2002). Mentoring as a model for technology teacher professional development has been shown to benefit both mentors and mentees and to transform understanding of technology as a tool for teaching and learning (Lawless & Pellegrino, 2007, Vavasseur & MacGregor, 2008). Guskey (2000) recommends that professional development

should be ongoing and embedded, supporting the recommendation for mentoring beyond the course as teachers navigate their first year of blended teaching practice. Together the community of mentors and mentees could create what Wenger (1998) calls a community of practice, sharing their experiences while constructing a shared understanding of blended teaching and learning within the context of their school. This community of practice could be fostered in a group inquiry project or teacher action research to identify best practices for blended learning based on teachers' experiences and student outcomes. Bringing together teachers from different disciplines into an online community of practice has been shown as an effective tool to augment existing face-to-face technology PD and could encourage content-focused discussions as well as conversations about the best use of technology (Vavasseur & MacGregor, 2008). Matching teachers from the same content areas for technology-supported, content-focused action or inquiry research could help teachers to address questions related to their practice (Hughes & Ooms, 2004) such as the best way to increase student-student interaction in a blended science course or how to encourage active learning in a blended Algebra/mathematics course.

Within this one school, within the one grade level, three models of blended learning were enacted. In the design and development of their courses, teachers were not limited to a single model and were bound only by the limitation of how many computers were available in their classrooms. The school may choose to take a more formal approach in adopting one model or in identifying what each model should look like in terms of types of learning experiences and activities

that should be included, giving students a more consistent blended learning experience.

Cross-case analysis of the courses found that the four teachers also tended to use the same tools in similar ways, suggesting that their selection of tools or resources was related to prior technology training and experience. For example, the frequent use of Google forms as a quiz tool suggests that the teachers may have had specific training on using Google forms for assessment. Given this finding, the school should look strategically at other technology training and choose tools or approaches that would support blended learning or could be used in a blended learning approach.

As the pilot scales up to include tenth grade in Year Two, students will have potentially had more experience with blended learning than their teachers. Students will be more experienced in using the LMS, so this technology will be less of a barrier for them than in Year One. The tenth grade teachers should be given extra support and more guidance in incorporating active learning and higher order thinking skills into their instruction and to build on students' technology skills. For the ninth grade teachers, they should be encouraged to reflect on their experiences and given support in expanding the scope and kinds of learning experiences in their blended learning courses. The two teachers who achieved the greatest degree of blendedness were in the second year of developing their blended learning course. If possible, teachers should be given release time or provided with assistance to further develop their existing courses.

Specific recommendations for each course follow. The Biology I course showed strength in selecting meaningful and engaging content material, but more effort should be made to encourage student-student interaction in the form of online discussion and cooperative learning activities using technology. The H.O.P.E. course showed strength in using discussion forums for students to discuss, reflect on, and apply health-related concepts to their personal lives. However, the course should incorporate more opportunities for students to engage in analyzing, evaluating, and synthesizing information – perhaps in a project- or problem-based learning approach. The Algebra I course was well-organized and provided many interesting activities for remediation. A recommendation for the Algebra I course would be to embed opportunities for students to interact, perhaps in a peer question-and-answer forum or in the development of student-created tutorials or review activities.

Finally, studies of blended learning in higher education have found that to affect institutional change effectively, institutions must examine their own practices in detail (Taylor & Newton, 2013). As it prepares to scale the pilot in Year Two, the school should hold an in-depth debriefing with the teachers from Year One to identify strengths and weaknesses and needs for improvement. Previous to the start of Year One, teachers submitted proposals in the form of lesson or unit plans. These plans should be part of the debriefing so teachers can discuss what they were able to enact and what they weren't, identifying issues that may need correction at the school level.

In summary, recommendations for the profiled school are to:

- Offer the PD course earlier in the calendar year and continue it throughout the first semester of the school year;
- Provide blended learning mentors to teacher new to blended teaching and learning;
- Add more content modules but spread them out, requiring less work each week, to provide more information and to help teachers assimilate it;
- Take a strategic approach to other technology training to support the blended learning initiative;
- Focus training on including more active learning, interaction, and higher-order thinking skills in blended learning approaches;
- Consider what model of blended learning, if any, the school wishes to adopt and what that might look like; and to
- Examine the results of Year One as they prepare for Years Two-Five implementation.

Recommendations for Practice

The findings of this study yield recommendations for other schools or districts seeking to implement a blended learning initiative. Planning for this pilot began nearly two years before the start of Year One. The pilot focused on a single grade level with a plan to scale up to succeeding grades. Specific teachers within the grade level were targeted to participate because they were already technology users and open to new ideas. Although participation was open to other willing teachers in other grade levels, the focus of the initiative was on the ninth grade team. This approach worked well in getting teacher buy-in and concentrated resources and support on the ninth grade as a team trying something new together. Had the school decided to implement in all grades 9-12, resources would have been spread thinner and teachers would not have had as much support as they began to develop their blended teaching practice. It is

recommended that other schools considering a blended learning initiative should allow for enough time to take a systematic approach to adequately plan and to consider how to scale the implementation.

Although professional development in blended learning was provided prior to the start of Year One, the findings of this study identified gaps that future PD should focus on: how to promote student-student interaction and collaboration, incorporating more active learning opportunities, and helping students to develop higher-order thinking skills. Further recommendations would be for the PD to be ongoing throughout the first year, incorporating blended learning mentors, building a community of practice among participating teachers, and giving teachers additional compensation or release time to develop their courses. To implement a successful blended learning program requires an alignment of institutional goals with the needs of teachers and outcomes for students, adequate infrastructure and resources, and ongoing evaluation of practices (Moskal, Dziuban, & Hartman, 2013). Having a shared vision and technology integration plan, ensuring adequate resources are available, focusing on changing attitudes and beliefs, and providing professional development are important strategies to overcome barriers and achieve successful integration of any technology (Hew & Brush, 2006).

Recommendations for Future Research

The field of blended learning and teaching in K-12 education is still relatively new. While blended learning becomes an increasingly popular option, there is still a notable lack of research specifically about blending in K-12 (Halverson, Graham, Spring, & Drysdale, 2012). While this study adds to the

body of knowledge about blended learning as it is enacted in an actual K-12 school, it had limitations and leaves room for further research. One limitation of this study is that it only collected data from the online portion of the teachers' blended learning courses for the first semester of the school year. A recommendation for future research would be to conduct the study again collecting additional data for a full school year from teacher interviews, teachers' lesson plans, and observations of the face-to-face portion of the blended learning course. It would also be interesting to follow the teachers longitudinally, comparing their subsequent years of blended teaching practice to their first and to compare the first year of the tenth grade teachers brought in during Year Two with the first year of the ninth grade teachers brought in during Year One. This study analyzed the contents of the online portion of the four blended learning courses and drew conclusions about the teachers' designs and used student activity to make assumptions about the way the courses were enacted. It is impossible to get a full picture of the course without also observing what took place in the face-to-face portion. Interviews with the teachers about their experiences, their perspectives on technology and blended learning, and their intentions in designing and enacting their courses are needed to fully understand decisions that were made and why some portions of the course were implemented and others were not. Also, attention should be given to teachers' lesson plans in comparison to what is designed within the learning management system.

This study used the iNACOL standards as one tool in evaluating the four blended learning courses. Ingvarson and Rowe (2008) investigated the use of professional standards, such as the National Board for Professional Teaching's standards, to evaluate teacher quality and found them a valid measure. Research should be done into the validity and reliability of using iNACOL's *Standards for Quality Online Courses, Version 2* as a tool to evaluate online courses and online teaching. Furthermore, these standards are for online courses, not specifically blended courses. Given the range in definitions of what constitutes blended, the variety in blended learning models, and the infancy of the field, it would be difficult at this point to identify specific standards for blended courses and blended teaching, but research should be done to investigate this possibility. As with the iNACOL *Standards for Quality Online Courses, Version 2* (2011b), blended course standards could focus on the design and delivery of courses and how the technology is used to meet state and national content standards. The iNACOL *Standards for Quality Online Teacher, Version 2* (2011a) include the following strands that gauge how well an online teacher:

- Knows the concepts of effective online instruction and can create meaningful learning experiences;
- Understands technologies;
- Is able to plan, design, and incorporate strategies for active learning, application, interaction, participation, and collaboration;
- Set clear expectations and give feedback;
- Encourage ethical, safe behavior related to technology use;
- Has awareness of diversity and an ability to accommodate students' needs;
- Understands and can apply assessment strategies;

- Can design and deliver standards-based instruction and assessment;
- Uses data-driven decision making;
- Exhibits professionalism; and
- Employs instructional design principles for media and content.

These standards have direct crossover with the standards for courses. In the development of standards for blended teaching and learning, a similar differentiation should be made as to what the standards are assessing: courses or teaching. In this study, the blended courses were designed by the teachers who taught them, but in most online courses, the teacher is teaching a course that was designed by someone else – thus requiring separate standards. More research needs to be done in K-12 blended learning to identify who is designing and developing blended courses and the source of the curriculum. Content standards should address what students are doing and should drive the curriculum while course or teaching standards should address what teachers are doing to help students access the curriculum and master the standards. If it is found that the majority of K-12 blended courses are teacher-designed, then it may not be necessary to separate standards for quality blended courses and quality blended teaching.

New publications such as Caitlin *Tucker's Blended Learning in Grades 4-12: Leveraging the Power of Technology to Create Student-Centered Classrooms* (2012) and Kristin Kipp's *Teaching on the Education Frontier: Instructional Strategies for Online and Blended Classrooms Grades 5-12* (2013) indicate that there is a growing body of knowledge of best practice in blended teaching, but it is not necessarily research-based. This study looked at four K-12

blended learning courses, but, in effect, its focus was on blended teaching practices, not student achievement or outcomes. More formal study should be done to identify best practices and their impact on student outcomes.

From the data in this study, four continuums emerged: degrees of blendedness, relative student activity, enactment of design, and the range between learning with technology versus learning from technology. Each of the four courses fell in a similar position relative to the other courses on each continuum. The location also coincided with each teacher's experience with blended and online teaching and learning, suggesting that experience was at least one factor in the final enactment of each course. Other factors could have been differences in subject culture or differences in technology skill. Further research should be done to investigate the relationship between and among these continuums and their correlation with these factors.

Horn and Staker's work (2011; Staker & Horn, 2012) identified and discussed models of blended learning as they're occurring in K-12 settings. The majority of studies on blended learning have looked at student engagement, efficacy, and models for delivery (Drysdale, Graham, Spring, & Halverson, 2013; Halverson, Graham, Spring, & Drysdale, 2012) as well as the importance of facilitation within courses (de la Varre, Keane, & Irvin, 2011). Graham (2006) identified a need for more information about what occurs in the online portions of blended courses in terms of what kind of content, resources, or activities are developed in the LMS. This study sought to address that need by investigating how four teachers, in four different content areas, designed and enacted their

blended learning courses. What is missing from the knowledge base is more information about what exactly occurs in K-12 blended courses in terms of degrees of blendedness, how technology is being used as a tool, course design, and student activity and engagement. Also, further investigation should be done into teacher experience with blended and online learning, both as a learner and as an instructor, as a factor in the effectiveness of blended and online learning in K-12 settings.

Summary

This case study investigated the ways that teachers enacted blended learning practices and standards following online professional development, what kinds of resources or activities they incorporated in the online portion of their courses, what student activity in the LMS indicated about the purpose of instructional materials, and how the design and enactment of courses differed across the content areas. It found that, although all four teachers had the same professional development course, they designed and enacted their courses quite differently. Teachers with more blended teaching experience were better able to enact their courses as designed, with a higher degree of blendedness, with more student activity and engagement, using technology as a tool to learn with, not from.

Blended learning is increasingly seen as an important pedagogical approach (Picciano, 2009) rather than just a disruptive technological innovation (Christensen, Horn, & Staker, 2013). It has the potential to bring together the best of both worlds: the richness of the face-to-face classroom with the flexibility of the online medium. Within K-12 education, blended learning is still in its

infancy and more research must be done to understand how to make blended learning the effective integration of the online with the face-to-face such that the two modes are merged as complementary components of a single, blended approach. Teachers need professional development that helps them to build their pedagogical, content, and technological knowledge to help them develop blended learning courses that foster active learning, higher order thinking skills, and the ability to communicate clearly and collaborate with others.

APPENDIX A
TYPES OF TEACHER BLENDED LEARNING PROPOSALS

Proposal Type	Description	Number of Participants Submitting
A. Blended Basics	The goal of this project is to build a strong structural foundation for developing a blended learning course/model for the future. This project stimulates thinking in the areas of: unit organization, pacing, and appropriate venue for given activities and content.	0
B. Researching and Developing Online Resources	The goal of this project is to culminate in the development of a robust repository of online content for student and faculty use. This resource must be online and accessible by all, appropriately tagged, and organized for future use. Tagging protocol must identify elements by unit, topic, and support access to differentiated resources for learning.	1
C. Digital Content Production	The goal of this project is to produce essential digital content to support face-to-face or out of class instruction and activity. Ultimately this content will be included as online resources or activities for a blended learning course. Prior to submission of this proposal, research must be undertaken to determine whether content is already available to meet the needs expressed by the proposer.	1
D. Transitioning Existing Course Content to the LMS	The goal of this project is to develop and house online content inside a learning management system (Moodle). In addition to the development of the content, the manner in which students will interact with content and expectations must be described.	3
E. Transitioning/ Developing Activities in the LMS	The goal of this project is to develop and implement online activities inside a learning management system. In addition to the development of the activities, descriptions how students will interact with activities and expectations must be described.	3

F. Blended Learning A-Z (full course)	The goal of this project is to develop and implement a blended learning course for the 2012-2013 school year. Participants in this project will develop robust online content to support face-to-face teaching and learning activities. Particular attention will be paid to best practices in designing and deploying online content, the relationship between face-to-face activities and content delivery and online activities and content, student habits of work/interactions in a technology-mediated environment, technology-mediated and supported differentiated instruction, and assessments for learning.	8*

* Four of these were joint efforts by a pair of teachers.

APPENDIX B
RUBRIC FOR ASSESSING PROPOSALS

1. Goal	**Clearly Present** includes detail, clearly connects response to stated goals, shows thought and analysis of question, context, and proposed development	**Present**, but lacking relevance (direct connection between stated goals and course context).	**Not Present**
Based on the course context, the goal aligns with the schools mission, reflects affordances and potential of blended learning	10 9 8 7 6	5 4 3 2 1	0
2. Description of Current State			
Provides clear detail identifying gaps that development will address	10 9 8 7 6	5 4 3 2 1	0
3. Description of Proposed Development			
Provides clear detail connecting proposed work to gaps in Sec. 2.	10 9 8 7 6	5 4 3 2 1	0
4. Justification for Development			
Provides supporting information to justify development work to be undertaken (importance of development, alignment with school goals, support for students, effect on teaching, student participation).	10 9 8 7 6	5 4 3 2 1	0
5. Required Resources			
Identifies resources (human, instructional, curricular, technology, software, and other) required to complete the project	10 9 8 7 6	5 4 3 2 1	0
6. Plan of Action			
Details time to be spent on activities related to proposed project.	10 9 8 7 6	5 4 3 2 1	0
7. Groundwork for Future Blended Development			
Describes how work proposed provides a foundation for future development activities	10 9 8 7 6	5 4 3 2 1	0
8. Artifacts			
Clearly details artifacts to be provided for review	10 9 8 7 6	5 4 3 2 1	0
Quantity of artifacts/amount of work reflects time allocated to project	10 9 8 7 6	5 4 3 2 1	0

APPENDIX C
OUTCOMES, OBJECTIVES, AND CONTENT OF THE ONLINE PD COURSE

Blended Learning PD Course Learning Outcomes

This course is focused on the following broad learning outcomes:

- Teacher-learners will develop an understanding of blended learning approaches and be able to implement them into their own teaching.
- Participants will form a community of practice within the school to support an ongoing pilot implementation of blended learning at the school.

Blended Learning PD Course Specific Learning Objectives

Upon completion of this course, teachers will be able to:

- Define blended learning.
- Explain the six models of blended learning and provide an example of each one.
- Provide a rationale for implementing blended learning in their personal teaching context.
- Analyze a current lesson or unit plan in terms of the iNACOL standards for quality online teaching and quality online courses as they apply to blended learning.
- Define the TPACK process for technology integration in teaching.
- Apply the five steps of the TPACK process to make decisions about integrating technology into a lesson plan.
- Plan a complete activity, lesson, or unit (as determined by the school) that implements blended learning for their classroom.

Course Content of the Online PD Course in Blended Learning

Module One: Setting the Stage

Introduction

In this first week we will be working to build a shared understanding of what blended learning is. It is important for us to develop a common language so we can begin to talk about what blended learning might look like when implemented at PKY. This module will have more reading than most others in order to build a shared understanding of blended learning. Later modules will be more focused on applying standards and concepts to your specific content area and project proposal.

Discussion: Finding Common Ground

Some of you may have had prior experience with blended or fully only learning. What was your experience like? Good or bad? Give a description of your prior experiences, if any, as a blended or online learner and share your primary concerns as you transition to being a teacher in a blended learning environment. The purpose of this discussion is to get a better idea of where everyone is coming from and general concerns as we move forward.

Since the goal is for our online discussions to be active and engaging, we ask that you make your initial post and then come back at least once more during the week to comment and interact with your peers.

Getting Started - Keeping Pace with K-12 Online

K-12 Online On The Rise

Since the 1990s, online learning in K-12 education has been on the rise. Currently, more than half the school districts in the United States offer online programs and services (Watson & Gemin, 2008), 30 states have full-time multi-district programs, and K-12 online enrollments are increased by 25% in school year 2010-1011, and online learning is available for K-12 students in every state and the District of Columbia (Watson et al, 2011). This explosive growth rate has been fueled by greater numbers of middle and high school students indicating a desire to take online courses (Watson & Gemin, 2008; Blackboard, 2010; Watson et al, 2011). Over a million students took online courses in K-12 programs in the 2007-2008 school year (Picciano & Seaman, 2009). According to the International Association for K-12 Online Learning (iNACOL), at least four states and two school districts now mandate online courses for high school students and more states are considering such legislation (iNACOL, 2011). Single district programs are the fastest growing segment of online and blended learning and most district programs are blended rather than fully online (Watson et al, 2011).

K-12 Online in Florida

In Florida, beginning with students entering ninth grade in 2011-2012, all students must take an online course as a graduation requirement (Watson et al, 2011). The Digital Learning Now Act "requires school districts to establish virtual instruction options; authorizes the establishment of virtual charter schools & provides requirements; authorizes blended learning courses; provides additional requirements for Florida Virtual School; requires full-time & part-time school district virtual instruction program options; provides funding & accountability requirements; requires online learning course for high school graduation; redefines FTE student for purposes of virtual instruction" (http://www.myfloridahouse.gov/sections/Bills/billsdetail.aspx?BillId=46852).

The Florida Virtual School (FLVS) is the largest state-led K-12 online school in the United States. For school year 2010-2011, FLVS had 259,928 course enrollments, an increase of 22% over the previous year (Watson et al, 2011). Due to changes in the law, districts that had previously contracted with FLVS to provide their online courses will now lose the FTE money for those enrollments. As a result, districts are working towards establishing their own online course offerings.

What Does This Mean for Us?

Like other districts in Florida, P.K. Yonge will lose FTE for students enrolling at FLVS. Students in our high school fall under the graduation requirement to take an online course. This means that we need to work towards building our own online course offerings. However, this does not happen over night! It is our goal to build a quality program focused on the new "Three E's of Education": enabled, engaged, and empowered. As the PKY Blended pilot is initiated, we will focus on these E's for both students and teachers.

Assigned Reading:

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2011). Keeping pace with K-12 online learning: An annual review of policy and practice. Evergreen, CO: Evergreen Consulting.

The Keeping Pace annual report gives an overview of blended and online learning in the United States each year. Please focus your reading on pages 1-11 and 19-20 for an overview and definitions and pages 81-85 for the profile on Florida. It is important for us to look at what is happening around the country and state as we develop a vision for PKY.

Keeping Pace 2011 1-11, 19-20, 52-61 (later module), Florida 81-85

Defining Blended Learning

In the field of online education, some have called the combination of online and face-to-face (F2F) instruction "blended", "hybrid", or "web-enhanced" and have sought to differentiate between these terms by applying percentages of time spent on/offline or types of activities for one setting over the other.

The International Association for K-12 Online Learning (iNACOL) has worked to identify common definitions for practitioners and researchers in K-12 blended and online education.

For our purposes, we will start with iNACOL's definitions:

- Blended course: a course that combines two modes of instruction, online and face-to-face
- Blended learning: blended learning is any time 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; often used synonymously with Hybrid Learning (Horn and Staker, 2011).

Based on the idea that blended is any combination of online and F2F, Dziuban, Hartman and Moskal (2004) in a research brief for EDUCAUSE titled “Blended Learning” noted:

"Blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment, rather than a ratio of delivery modalities. In other words, blended learning should be approached not merely as a temporal construct, but rather as a fundamental redesign of the instructional model with the following characteristics:

- A shift from lecture- to student-centered instruction in which students become active and interactive learners (this shift should apply to the entire course, including face-to-face contact sessions);
- Increases in interaction between student-instructor, student-student, student-content, and student-outside resources;
- Integrated formative and summative assessment mechanisms for students and instructor."

In this view, blended learning represents a shift in instructional strategy that changes how teachers and administrators view online learning in the face-to-face setting.

Blended Learning and the [School Name] Wave of Innovation:

What Blended Learning IS…

- intended to support student success
- relationship between face-to-face and online learning experiences
- dependent on highly-qualified, highly-motivated teacher AND robust online content and activities

Blended Learning is NOT…

- a strictly defined amount of online and face-to-face teaching and learning
- a combination of specific online tools and specific face-to-face interactions
- the answer to every educational and behavioral issue ever encountered in the history of teaching K-12
- the eradication of every paper-based learning activity or communication type

Blended Learning CAN…

- support differentiation (online and face-to-face)
- provide access to content online 24-7
- support participation in online activities in and outside the classroom
- support practice and review
- support assessment (self, formative, summative)
- provide improved opportunities to access data to inform instructional decisions
- support flexibility

Blended Learning CANNOT…

- be a substitute for a highly-motivated, highly-qualified teacher
- make students focus and learn without intervention from a teacher
- be successful in supporting student success without a strong relationship between face-to-face learning and online learning (content and activities)

Blended Learning Models

In a study of blended learning programs across the country, researchers at the Innosight Institute identified six models for blended learning.

1. Face-to-Face Driver: F2F teachers deliver most of their curricula, online learning is used for supplemental and remediation activities, often in a separate area of the classroom or a computer lab.

2. Rotation: Within a given course, students rotate on a fixed schedule between learning online in a one-to-one, self-paced environment and sitting in a classroom with a traditional F2F teacher. The F2F teacher oversees the online work.

3. Flex: Most of the curricula are delivered online and teachers provide flexible support through tutoring and small-group sessions.

4. Online Lab: The entire course is delivered online but in a supervised brick-and-mortar lab environment.

5. Self-Blend: Students choose which courses to take in their traditional brick-and-mortar school and select courses they wish to take online with a supplemental online school such as FLVS.

6. Online Driver: Students work primarily remotely online but have F2F check-ins with a teacher who supervises their online work.

As you move forward in thinking about what blended learning will look like in your classroom, it is important to remember that the emphasis should be on student LEARNING rather than on TEACHING. Learners should be actively engaged in the learning process, learning should be based on real-life and authentic situations as much as possible, and learning should be focused on the content rather than the tool. The technology should support the curriculum rather than drive it. In later modules, we will discuss specific strategies for implementing and managing blended learning and designing for your course.

Assigned Reading:

International Association for K-12 Online Learning. (2011).The online learning definitions project. Vienna, VA: Author.
Please read pages 1-9, familiarizing yourself with these terms.

Watson, J. (2008). Promising practices in online learning: Blended learning: The convergence of Online and Face-to-Face education. Vienna, VA: International Association for K-12 Online Learning.
Pages 1-6 provide an overview of blended learning and will be a jumping-off point for our discussions.

Staker, H. (2011). The rise of K-12 blended learning: Profiles of emerging models. Innosight Institute.
Pages 1-7 provide more detail on models of blended learning that are being implemented around the country.

Bonk, C. & Graham, C. (2006). Handbook of blended learning: Global perspectives, local designs. San Francisco, CA: Pfeiffer Publishing. Part 1, Introduction.
Pages 8-16 cover current trends and issues, levels and categories of blending, and some issues and challenges.

Discussion: Defining Blended Learning

In this module, you have read various definitions and descriptions of blended learning. Based on your readings, how would you define blended learning? How has this definition changed based on what you've learned? How do you see that definition fitting in with your own teaching and learning environment? What concerns do you still have as you move forward? Since the goal is for our online discussions to be active and engaging, we ask that you make your initial post and then come back at least once more during the week to comment and interact with your peers.

References

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Module Two: Where Are We Now?

Introduction

In this module, you will be asked to think about what teaching and learning looks like in your current course and to identify "where you are" laptop and puzzle piece in terms of your prior experience with blended and online learning as well as your comfort and skill levels with regard to using technology in the classroom. You will begin to look at standards for online teaching and online courses and to review a current lesson or unit plan to identify what aspects of your current course might lend themselves to online delivery/activities. In this module we will start to pull together the puzzle pieces that will make up the final product for your project proposal.

Discussion: Idea Sharing

You have all submitted a proposal to develop some kind of blended learning activity or resource. Give a brief overview of your proposal for the group. What kinds of activities do you think would best lend themselves to a blended learning format? How do you see students engaging online? Are there any activities you cannot see working in a blended or online format at this point? Since the goal is for our online discussions to be active and engaging, we ask that you make your initial post and then come back at least once more during the week to comment and interact with your peers.

Activity: Reviewing Your Current Course

The International Association for K-12 Online Learning (iNACOL) has developed standards for quality online courses and quality online teaching. These standards were revised in 2011. For this activity, please review a lesson or unit plan from

your current course and comment on strengths and weaknesses with regard to the iNACOL standards. Refer to specific strands within the standards as appropriate. Because your course is not yet online, some areas may not apply. You may comment on what you will need to do to prepare to meet those standards, if they will apply at all, and what concerns you have about them. This activity is meant to be a reflective self-evaluation and you will not be judged based on your responses. Your responses will help us to plan for further professional development as the project moves forward.

Please submit both the lesson or unit plan you used for this self-evaluation and the evaluation worksheet.

Discussion: Where Am I Now?

In this module you looked at the iNACOL standards for quality online courses and quality online teaching. In thinking about your own teaching practices, how well do you feel prepared to develop a blended learning lesson, unit, or course? What areas of the standards do you feel are your strengths? Where do you feel you need the most professional development? Since the goal is for our online discussions to be active and engaging, we ask that you make your initial post and then come back at least once more during the week to comment and interact with your peers.

Module Three: Strategies for Blended Learning

Introduction:

Now that you have developed a better understanding of what blended learning is and have looked at standards for best practices for online courses and online teaching to evaluate an existing lesson or unit plan, we will look at how to transition to a more blended format. In this module we will look at some lesson plans from Florida TechNet, a project of the Florida Department of Education and look more closely at specific strategies and tools for developing blended components for activities, lessons, and unit plans. In this phase of the project, you will be asked to revisit your original proposal for revision based on what you've learned about blended learning, the self-reflection and evaluation you did based on the iNACOL standards, and the strategies and tools discussed in this module.

Making Decisions: Processes for Blending
TPACK: Technological Pedagogical Content Knowledge

When teachers choose to integrate technology into their teaching, they draw on different kinds of knowledge. They bring together content knowledge (CK), which is the information or skills that they are required to teach; they use their pedagogical knowledge (PK) about the most effective ways to teach it; and they

employ their technological knowledge (TK) to choose tools and resources to integrate in their classroom or course.

The TPACK model (image copyright free from tpack.org)

This is a complex process but it can be simplified into five basic steps (Harris & Hafer, 2009). These steps are:

- Choosing learning goals
- Making practical pedagogical decisions about the nature of the learning experience
- Selecting and sequencing appropriate activity types to combine to form the learning experience
- Selecting formative and summative assessment strategies that will reveal what and how well students are learning
- Selecting tools and resources that will best help students to benefit from the learning experience being planned

You already know what your learning goals are and you made some decisions about your pedagogical approach. Now we will look at the challenges for creating activities, lessons, and units that have blended aspects. As you look at different tools and think about how you want to structure activities, keep in mind that the key is to keep students engaged in meaningful learning activities driven by learning objectives and outcomes. Technological tools cannot replace you as a teacher and shouldn't be the focus of the activity, rather tech tools are a means to achieving an end: student mastery of the stated learning objective.

Reading: Activity Types & Tools

Now that you know you want to integrate more blended components into your course and try new tech tools, you must be wondering about how to choose tools to help your students achieve mastery of learning objectives in a way that is meaningful and engaging. Read this brief article by Harris and Hofer, paying special attention to the charts on pages 4-6.

Resource: List of Tech Tools

The following is a list of links to tech tools you might integrate into your classroom. Many of these are the ones listed in the Harris & Hofer article you will read in connection with this week's discussion. [Note: Each tool on this list was originally hyperlinked for more information about it.]

Audio/Podcasts:

- Apple's Garage Band - part of the iLife software on most Macs
- Audacity - free audio editing software

Blogs, Wikis & Other Social Tools:

- Moodle has both blog and wiki tools. However they are not as robust as others available online.
- Blogger - now a part of Google tools - free blogspace
- EdModo - free social networking platform specifically for K-12 classrooms
- Google Docs - works just like a wiki. Students can work collaboratively on a document, spreadsheet, or presenation file.
- WikiSpaces - free wiki space

Concept Mapping Tools:

- Inspiration and Kidspiration - software available at PKY
- Bubbl.us - free online tool for concept mapping
- FreeMind - http://freemind.sourceforge.net (free software you can download for Mac/Windows)
- http://www.gliffy.com/ -free online site
- http://www.webspirationpro.com/ -free 30-day trial for the website - from the Inspiration and Kidspiration folks
- Directions for making a concept map in MS Word -
- http://www.ehow.com/how_4927645_make-concept-map-microsoft-word.html#page=0

Digital Storytelling Tools:

- Animoto - make slideshows or videos set to music. The free version gives you unlimited 30-second videos.
- Gimp - free graphics software for Mac or Windows
- GoAnimate - students can create free online cartoons. Fun!
- Google Earth and Google Lit Trips - http://www.googlelittrips.com is a great tool for creating a geographic representation to tell a story. It adds perspective for relative distance, and you can include photos, other images, Wikipedia links, or other weblinks to help tell your story.
- Graphic Converter - super cheap Mac software for editing graphics
- iMovie - part of iLife software on most Macs
- MovieMaker - part of Windows essentials
- Photoshop - part of Adobe Creative Suite
- VoiceThread - create and edit collaborative presentations

Online Content:

- Online directory of teacher resources from FDLRS Resource Materials Center for the Deaf & Hard of Hearing. Kay Ezzell has amassed an extensive directory of resources on a variety of content topics for teachers and students. Check out their Application Tutorials page to learn more about lots of different tech tools.
- Khan Academy - great source for online tutorials and lessons on a variety of subjects!

Screen Capture Tools:

- SnagIt - screen capture software (free 30-day trial)
- Jing - SnagIt's big brother. You can capture still images or screencasts of you moving on the screen. The free version is somewhat limited but still pretty cool!
- Camtasia - another TechSmith screen capture product. It's more sophisticated than Jing.
- Screenflow - relatively inexpensive software (with a free trial) for capturing your screen or voicing over presentations.

Examples: What Does a Blended Lesson Look Like?

An Example

This is a screenshot from a blended course. This instructor uses a combination of tools: learning logs/blogs, wikis for collaboration, links to websites for students to review, discussion forums, an interactive white board, Scratch (a tool for kids to create their own computer games), and a traditional textbook. The structure is clear for students so they can see what they will be doing in class, what they need to do to prepare for class, and what the textbook assignment is.
[screenshot of a blended course]

But How Do I Do That?

Let's look at some lesson plans and some strategies for adding blended pieces to them.

The following lesson plans are from Florida TechNet, a project of the Florida Department of Education. These lesson plans are from their library of lesson plans for GED adult education, covering basic information for secondary courses.

Lesson #1: The Declaration of Independence
(Full lesson plan in PDF format.)
[image of lesson plan on Declaration of Independence]

Let's look at this social studies lesson plan and how it could fit in a blended classroom.

Students could view the "I Have a Dream" speech as well as or in place of listening to it and reading it online.

Students could view an online copy of the Declaration of Independence and then work in discussion forum groups or in a wiki to come up with the summary of their section and to create the outline of the supporting details.

Students could use an online concept-mapping tool such as Bubbl.us or Gliffy to create a visual representation of their group summaries or of the Declaration

itself and find visual representations of the concepts within it. They could post these online or share their digital presentations in class.

To make the "real-life connection", students could look for articles and examples on line and post them to a wiki or blog about what the ideals of the Declaration mean to them. They could even write their own version of the Declaration and post it.

As students do these online pieces and post in the LMS, the teacher could work with students individually or in small groups on their writing skills as they refine their essays and compare drafts.

The online pieces of this lesson could be done in the classroom, allowing the teacher to work with individual students or small groups while other students work and interact in the LMS. The teacher could have preselected resources for students to view or having students identify sources and give an evaluation of their content could be part of the lesson, building media literacy skills.

Lesson #2: A Body Dilemma

(Full lesson plan in PDF format.)

[lesson #2 screenshot]

Here is a science lesson plan. How could this lesson be made to fit in a blended classroom?

Students could view a page listing preselected websites and complete a webquest to learn more about the issue of selling body parts.

The teacher could post the handouts online for students to view at school or at home. Students could view materials as homework so they're prepared for the classroom discussion or activities.

Students could post their pros and cons lists to a wiki or shared file such as a Google Doc and participate in small-group or whole-class discussion forums to debate the issue.

Students could create persuasive PowerPoint, Prezi, or VoiceThread presentations to try to convince others about an aspect of the issue.

Students could extend this lesson by organizing an organ donor drive for students 18 years or older. This could be organized using social media such as blogs, social networking sites, or creating a digital video presentation and posting it to YouTube or Vimeo.

Lesson #3: Using Central Tendency to Compare Data

(Full lesson plan in PDF format.)

[lesson #3 central tendency lesson plan]

Finally, let's look at a math lesson plan.

Students could use an online practice site or game to practice working with measures of central tendency.

The teacher could use the surveys tool in Moodle to collect data for students to work with. The teacher would post questions, students would respond in the LMS, and then the teacher could post the data for students to work with. Students could submit questions and collect data based on responses in the discussion forum or using a free tool like Survey Monkey.

In this lesson plan, students look at weather information in the newspaper to compare temperatures. Students could follow links to online databases to compare statistics about different countries, industries, or environmental factors and post a summative report explaining their findings based on the data they compared.

The teacher could post tutorials or notes for students to refer to while they do their homework outside of class.

Students could create charts or graphs using an online tool such as Create A Graph and include them in papers or digital presentations. Students could share these in a discussion forum to talk about the issues they researched stats for or submit them to the teacher with the assignments tool in Moodle.

Discussion: How Do I Choose Tools?

Now that you know you want to integrate more blended components into your course and try new tech tools, you must be wondering about how to choose tools to help your students achieve mastery of learning objectives in a way that is meaningful and engaging. Read this brief article by Harris and Hofer, paying special attention to the charts on pages 4-6.

After looking at the charts and thinking about activity types you would like to try, investigate one or more of the tech tools (if they are unfamiliar to you) and describe how you might integrate it into a specific activity or lesson. Describe the activity type or your lesson, the tool(s), how you would see it fitting into your classroom, and any issues or concerns you have about it. How do you think students will respond to it? How is it similar or different from what you already do? Did you find a tool that was new and interesting to you? Since the goal is for our online discussions to be active and engaging, we ask that you make your initial post and then come back at least once more during the week to comment and interact with your peers.

Module Four: Project Sharing and Curriculum Development

This week you will share the revision of the deliverables section of your proposals in a discussion forum. This is based on meetings that you have had with Julie and Christy to clarify your deliverables prior to starting work on your project. Please attach the revised file in the forum.

Now that you have developed a deeper understanding of what blended learning is and the tools that are available, please create a post describing how your understanding has changed and how it will support the work you will perform over the summer.

Give a brief overview of your project and attach your revised deliverables for your colleagues to view. Please view the deliverables of others in your group and provide constructive comments or feedback in support of your peers.

You may also view and comment on the proposals of other groups. Looking at what others are doing with different degrees of blended learning in their courses could be helpful to you as you go into your summer work.

As a reference, here are the original proposal guidelines for each group:

B Researching & Developing Online Resources
C Digital Content Production
D Transitioning Existing Course Content to LMS
E Transitioning/Developing Activities in an LMS
F Blended Learning A-Z

APPENDIX D
INACOL STANDARDS FOR QUALITY COURSES, VERSION 2 (INACOL, 2011B)

Academic Content Standards and Assessments	A.1. The goals and objectives clearly state what the participants will know or be able to do at the end of the course. The goals and objectives are measurable in multiple ways.
	A.2. The course content and assignments are aligned with the state's content standards, common core curriculum, or other accepted content standards set for Advanced Placement® courses, technology, computer science, or other courses whose content is not included in the state standards.
	A.3. The course content and assignments are of sufficient rigor, depth and breadth to teach the standards being addressed.
	A.4. Information literacy and communication skills are incorporated and taught as an integral part of the curriculum.
	A.5. Multiple learning resources and materials to increase student success are available to students *before the course begins*.
Course Overview and Introduction	A.6. A clear, complete course overview and syllabus are included in the course.
	A.7. Course requirements are consistent with course goals, are representative of the scope of the course and are clearly stated.
	A.8. Information is provided to students, parents and mentors on how to communicate with the online instructor and course provider.
Legal and Acceptable Use Policies	A.9. The course reflects multi-cultural education, and the content is accurate, current and free of bias or advertising.
	A.10. Expectations for academic integrity, use of copyrighted materials, plagiarism and netiquette (Internet etiquette) regarding lesson activities, discussions, and e-mail communications are clearly stated.
	A.11. Privacy policies are clearly stated.
Instructor Resources	A.12. Online instructor resources and notes are included.
	A.13. Assessment and assignment answers and explanations are included.
Instructional and Audience Analysis	B.1. Course design reflects a clear understanding of all students' needs and incorporates varied ways to learn and master the curriculum.
Course, Unit and Lesson Design	B.2. The course is organized by units and lessons that fall into a logical sequence. Each unit and lesson includes an overview describing objectives, activities, assignments, assessments, and resources to provide multiple learning opportunities for students to master the content.
Instructional Strategies and	B.3. The course instruction includes activities that engage students in active learning.

Activities	B.4. The course and course instructor provide students with multiple learning paths, based on student needs that engage students in a variety of ways.
	B.5. The course provides opportunities for students to engage in higher-order thinking, critical reasoning activities and thinking in increasingly complex ways.
	B.6. The course provides options for the instructor to adapt learning activities to accommodate students' needs.
	B.7. Readability levels, written language assignments and mathematical requirements are appropriate for the course content and grade-level expectations.
Communication and Interaction	B.8. The course design provides opportunities for appropriate instructor-student interaction, including opportunities for timely and frequent feedback about student progress.
	B.9. The course design includes explicit communication/activities (both before and during the first week of the course) that confirms whether students are engaged and are progressing through the course. The instructor will follow program guidelines to address non-responsive students.
	B.10. The course provides opportunities for appropriate instructor-student and student-student interaction to foster mastery and application of the material.
Resources and Materials	B.11. Students have access to resources that enrich the course content
Evaluation Strategies	C.1. Student evaluation strategies are consistent with course goals and objectives, are representative of the scope of the course and are clearly stated.
	C.2. The course structure includes adequate and appropriate methods and procedures to assess students' mastery of content.
Feedback	C.3. Ongoing, varied, and frequent assessments are conducted throughout the course to inform instruction.
	C.4. Assessment strategies and tools make the student continuously aware of his/ her progress in class and mastery of the content.
Assessment Resources and Materials	C.5. Assessment materials provide the instructor with the flexibility to assess students in a variety of ways.
	C.6. Grading rubrics are provided to the instructor and may be shared with students.
	C.7. The grading policy and practices are easy to understand.
Course Architecture	D.1. The course architecture permits the online instructor to add content, activities and assessments to extend learning opportunities.
	D.2. The course accommodates multiple school calendars; e.g., block, 4X4 and traditional schedules.
User Interface	D.3. Clear and consistent navigation is present throughout the course.
	D.4. Rich media are provided in multiple formats for ease of use and access in order to address diverse student needs.

Technology Requirements and Interoperability	D.5. All technology requirements (including hardware, browser, software, etc...) are specified.
	D.6. Prerequisite skills in the use of technology are identified.
	D.7. The course uses content-specific tools and software appropriately.
	D.8. The course is designed to meet internationally recognized interoperability standards.
	D.9. Copyright and licensing status, including permission to share where applicable, is clearly stated and easily found.
Accessibility	D.10. Course materials and activities are designed to provide appropriate access to all students. The course, developed with universal design principles in mind, conforms to the U.S. Section 504 and Section 508 provisions for electronic and information technology as well as the W3C's Web Content Accessibility guidelines (WCAg 2.0).
Data Security	D.11. Student information remains confidential, as required by the family Educational Rights and Privacy Act (FERPA)
Accessing Course Effectiveness	E.1. The course provider uses multiple ways of assessing course effectiveness.
	E.2. The course is evaluated using a continuous improvement cycle for effectiveness and the findings used as a basis for improvement.
Course Updates	E.3. The course is updated periodically to ensure that the content is current.
Certification	E.4. Course instructors, whether face- to-face or virtual, are certificated and "highly qualified." The online course teacher possesses a teaching credential from a state-licensing agency and is "highly qualified" as defined under ESEA.
Instructor and Student Support	E.5. Professional development about the online course delivery system is offered by the provider to assure effective use of the courseware and various instructional media available.
	E.6. The course provider offers technical support and course management assistance to students, the course instructor, and the school coordinator.
	E.7. Course instructors, whether face- to-face or virtual, have been provided professional development in the behavioral, social, and when necessary, emotional, aspects of the learning environment.
	E.8. Course instructors, whether face- to-face or virtual, receive instructor professional development, which includes the support and use of a variety of communication modes to stimulate student engagement online.
	E.9. The provider assures that course instructors, whether face-to-face or virtual, are provided support, as needed, to ensure their effectiveness and success in meeting the needs of online students.
	E.10. Students are offered an orientation for taking an online course before starting the coursework.

APPENDIX E
MATRIX OF INACOL STANDARDS USED TO ASSESS BLENDED LEARNING COURSES

		Algebra	Biology	English	H.O.P.E.
Section A. Content					
Academic Content Standards and Assessments	A.1. The goals and objectives clearly state what the participants will know or be able to do at the end of the course. The goals and objectives are measurable in multiple ways.	Yes	Yes	No	Yes
	A.2. The course content and assignments are aligned with the state's content standards, common core curriculum, or other accepted content standards set for Advanced Placement® courses, technology, computer science, or other courses whose content is not included in the state standards.	Yes	Yes	No	No
	A.3. The course content and assignments are of sufficient rigor, depth and breadth to teach the standards being addressed.	Yes	Yes	Yes	Yes
	A.4. Information literacy and communication skills are incorporated and taught as an integral part of the curriculum.	No	Yes	Yes	Yes
Course Overview and Introduction	A.6. A clear, complete course overview and syllabus are included in the course.	No	Yes	Partially	Yes

	A.7. Course requirements are consistent with course goals, are representative of the scope of the course and are clearly stated.	Yes	Yes	Yes	Yes
Section B. Instructional Design					
Instructional and Audience Analysis	B.1. Course design reflects a clear understanding of all students' needs and incorporates varied ways to learn and master the curriculum.	Yes	Yes	Yes	Yes
Course, Unit and Lesson Design	B.2. The course is organized by units and lessons that fall into a logical sequence. Each unit and lesson includes an overview describing objectives, activities, assignments, assessments, and resources to provide multiple learning opportunities for students to master the content.	Yes	Yes	Yes	Yes
Instructional Strategies and Activities	B.3. The course instruction includes activities that engage students in active learning.	No	Yes	Yes	Yes
	B.4. The course and course instructor provide students with multiple learning paths, based on student needs that engage students in a variety of ways.	No	Yes	Yes	Yes
	B.5. The course provides opportunities for students to engage in higher-order thinking, critical reasoning activities and thinking in increasingly complex ways.	No	Yes	Yes	No
	B.6. The course provides options for the instructor to adapt learning activities to accommodate students' needs.	Yes	Yes	Yes	Yes

	B.7. Readability levels, written language assignments and mathematical requirements are appropriate for the course content and grade-level expectations.	Yes	Yes	Yes	Yes
	B.10. The course provides opportunities for appropriate instructor-student and student-student interaction to foster mastery and application of the material.	No	No	Yes	Yes
Resources and Materials	B.11. Students have access to resources that enrich the course content	Yes	Yes	Yes	Yes
Section C. Student Assessment					
Evaluation Strategies	C.1. Student evaluation strategies are consistent with course goals and objectives, are representative of the scope of the course and are clearly stated.	Yes	Yes	Yes	Yes
	C.2. The course structure includes adequate and appropriate methods and procedures to assess students' mastery of content.	Yes	Yes	Yes	Yes
Feedback	C.3. Ongoing, varied, and frequent assessments are conducted throughout the course to inform instruction.	Yes	Yes	Yes	Yes
Section D. Technology					
User Interface	D.3. Clear and consistent navigation is present throughout the course.	Yes	Yes	Yes	Yes
	D.4. Rich media are provided in multiple formats for ease of use and access in order to address diverse student needs.	Yes	Yes	Yes	Yes

Accessibility	D.10. Course materials and activities are designed to provide appropriate access to all students. The course, developed with universal design principles in mind, conforms to the U.S. Section 504 and Section 508 provisions for electronic and information technology as well as the W3C's Web Content Accessibility guidelines (WCAg 2.0).	Yes	No	Yes	Yes

APPENDIX F
DESIGN FEATURES ACROSS COURSES

	Standards	Algebra I	Biology I	English I	HOPE
Course Organization Structure					
Structure used (modules, weeks, topics, lessons)	B.2, D.1, D.3	Lessons	Units	Quarters	Units - parts
Number of modules, weeks, topics, or lessons	B.2, D.1, D.3	27	11	2	5
Online resources and materials are compliant with accessibility standards	D.10	Yes	No	Yes	Yes
Course Content and assignments are of sufficient rigor, depth, & breadth to address standards	A.3, A.7, B.7	Yes	Yes	Yes	Yes
Information literacy skills are incorporated into online portion of course	A.4	No	Yes	Yes	Yes
Introduction					
Provides introduction to the topic	A.6	No	Yes	Partially	Yes
Puts content in context	A.6, A.7	No	Yes	Partially	Yes
Sets a purpose for learning	A.6	Yes	Yes	Yes	Yes
Objectives					
Identifies learning objectives	A.1, B.2	Yes	Yes	No	Yes
Identifies related standards	A.2, B.2	Yes	No	No	No
Delineates between F2F and online activities and assignments					
Clear delineation or separate sections for F2F and online	B.2	No	Yes	Partially	Yes
Readings and Resources					
Identifies readings from textbook or printed course materials	B.11	No	Yes	Yes	Yes
Provides readings in electronic format	B.11, D.4	Yes	Yes	Yes	Yes
Provides links to online readings	B.11	Yes	Yes	Yes	Yes
Embeds electronic media resources for students to view or listen to	B.11, D.4	No	Yes	No	No
Links to electronic media resources for students to view or listen to	B.11, D.4	Yes	Yes	Yes	Yes

Content information - print (e.g. PDF of a chapter)	B.4, B.7, B.11	Yes	Yes	Yes	Yes
Content information - multimedia (e.g. online video)	B.4, B.7, B.11	Yes	Yes	Yes	Yes
Procedural information (e.g. lab directions)	B.4, B.7, B.11	Yes, for online	Yes	Yes	No
Procedural information (e.g. lab directions)	B.4, B.7, B.11	Yes	Yes	Yes	No
Downloadable activity (e.g. worksheet)	B.4, B.7, B.11, D.4	Yes	Yes	Yes	Yes
Online activity within the LMS (e.g. online quiz or wiki in the LMS)	B.4, B.7	Yes	Yes	Yes	Yes
Online activity outside of the LMS (e.g. activity on another website)	B.4, D.7, B.7	No	Yes	Yes	Yes
Purpose					
Dissemination of content information	B.1, B.7	No	Yes	Yes	Yes
Dissemination of procedural information	B.4, B.7	No	Yes	Yes	Yes
Introduction of new concepts or skills	A.3, B.1, B.3, B.7	No	Yes	No	Yes
Skills practice or review	A.3, B.1, B.3, B.7	Yes	Yes	Yes	Yes
Assessment	A.3, B.1, B.3, B.7, C.1, C.2, C.3	Yes	Yes	Yes	Yes
Instructional Approaches					
Collaboration or cooperative learning	B.1, B.3, B.10	No	No	Yes	No
Group discussion	B.10	No	No	Yes	Yes
Research activity	B.1, B.3, B.4, B.5	No	Yes	Yes	No
Direct instruction / lecture presentation	B.1, B.3, C.1, C.2	Yes	Yes	No	Yes
Independent work for skills practice or review	B.1, B.3, B.4, C.1, C.2	Yes	Yes	Yes	Yes
Activities that require higher-order thinking skills	B.1, B.3, B.5	No	Yes	Yes	No
Activities that explicitly provide for differentiated instruction	B.1, B.4, B.6	Yes	No	Yes	Yes
LMS Tools – Activity Types					
Assignment - Uploading of files		No	Yes	Yes	Yes

Online text		No	No	Yes	Yes
Offline activity		No	No	Yes	Yes
Voice Thread		No	No	Yes	Yes
Forum		Yes	Yes	Yes	Yes
Quiz		No	No	Yes	No
Wiki		No	Yes	Yes	Yes
TurnItIn		No	No	Yes	Yes
LMS Tools – Resources Types					
File		Yes	Yes	Yes	Yes
Page		Yes	Yes	Yes	No
URL		Yes	Yes	Yes	Yes
Kaltura Video		Yes	Yes	Yes	Yes

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BIOGRAPHICAL SKETCH

Nicola Wayer is an experienced educator with extensive teaching and instructional design experience. She holds a Ph.D. from the University of Florida (2013) in curriculum and instruction with a concentration in educational technology; an M.Ed. from the University of North Florida (2001) in secondary education; and a Bachelor of Arts from Flagler College (1998) in deaf education and elementary education. While pursuing her doctoral studies, she served as an instructional designer and faculty trainer in the University of Florida College of Education and she is currently a lead instructional designer at Florida State College at Jacksonville. Her research interests include serving students with disabilities in blended and online courses and teacher professional development for blended and online learning.