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Blended Learning: Internal Factors Affecting Implementation

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To my **wife**. Thank you for supporting me throughout this process and for encouraging me to always do my best. I love you!

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VITA

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ABSTRACT

Blended learning is defined as an education program in which a student learns, at least in part, through online delivery of content and instruction and, at least in part, at a supervised brick-and-mortar location away from home (Staker & Horn, 2012). It is regarded as an effective learning model in terms of student outcomes; however, there are barriers to the implementation of blended learning. These barriers can be categorized as external or internal. The aim of this study was to determine and understand the barriers or factors that affect the implementation of blended learning. To accomplish this, it was important to understand what teachers who have implemented blended learning perceive as most influential to implementation. Seventy-five teachers that have implemented blended learning were surveyed. A combination of descriptive and inferential statistics was used to analyze the teachers' perceptions of which factors or barriers were most influential to implementation. Within this study, the least influential factors perceived to influence the implementation of blended learning included preservice experiences, parent support, class size, and previous failures. The most influential factor perceived to influence the implementation of blended learning was access to the internet. Internal factors were perceived to influence the implementation more than external factors. Teacher characteristics of gender, subject taught, education level, perceived computer proficiency, and computer-to-student ratio did not have a significant influence on perceived internal factors affecting implementation. Finally, years of experience and perceived internal factors affecting implementation were found to have a negative correlation.

SECTION ONE

Introduction

Imagine a classroom where students are walking around independently, collaborating with peers, and using online videos to learn about a particular topic; all while the teacher is working with a small group of struggling students. The students are all working on different things, at different paces, at different levels of academic difficulty, and even working in different classrooms. To some, this looks like a chaotic and out-of-control classroom with no structure and no teacher control, but to others, this is a prime example of a growing educational model known as blended learning. Blended learning is defined as a formal education program in which a student learns, at least in part, through online delivery of content and instruction; 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 (Staker & Horn, 2012).

Blended learning has shown to be a successful educational program. A meta-analysis conducted by the US Education Department (2009) reported the results of a comparison between blended learning, traditional face-to-face instruction, and online instruction in the K-12 setting and concluded that instruction with a combination of online and face-to-face elements had a larger advantage than purely online or traditional instruction (Means, Toyama, Murphy, Bakia, & Jones, 2009). Also, postsecondary faculty reported having their teaching invigorated by the experience of successfully implementing blended learning (Owston, Garrison, & Cook, 2006). Aside from positive student learning outcomes and positive instructor experiences, K-12 schools and teachers have turned to the implementation of blended learning to address the following goals: broadening access to instruction; facilitating small-group and one-to-one teacher-led instruction; serving students with diverse needs; providing more opportunity for productive practice; adding variety to instruction and enhancing student engagement; and supporting learning of complex, abstract concepts (Means, Toyama, Murphy, & Bakia, 2013).

I am currently in my third year of teaching at a small, rural school in Central Ohio. My first two years I taught 8th-grade science. My students' science abilities ranged from 2nd grade-11th grade, according to the NWEA General Science Measures of Academic Progress (MAP) assessment (Northwest Evaluation Association, 2015). To better accommodate all of my students' needs, I implemented a blended learning model. In terms of learning outcomes, the results were phenomenal. After my first two years of teaching, I had some of the highest test scores in the district on the state assessment and scored "most effective" in the area of student growth; both of which are well above the state average. This was all accomplished, as a new teacher, by using a blended learning model!

As I looked for more teachers who were having success with blended learning like I was, I came across an unexpected problem. What exactly was keeping teachers from using blended learning? Even with the many benefits noted in the field and supported by research, there are many challenges to note when schools and teachers are first trying to implement blended learning models. These challenges or barriers can be categorized as external or internal. External barriers include equipment or technology tools, time, physical environments, technical support, and administrative and/or peer support during the integration and implementation process and internal barriers are described as beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change (Ertmer, 1999). Understanding the implementation of barriers or what keeps teachers from using this highly effective and successful education program is the focus of this research study.

SECTION TWO

Literature Review

What is Blended Learning?

For the purpose of this study, blended learning is defined as a formal education program in which a student learns, at least in part, through online delivery of content and instruction; 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 (Staker & Horn, 2012). There are many different learning models that school districts and teachers are implementing that use technology integration; online delivery of learning and content; and student control over time, pace, path, and/or place. This is why Garrison & Kanuka (2004) found it very important to distinguish blended learning design from technology-enhanced or online-supported course design (Garrison & Kanuka, 2004). It is also important to distinguish blended learning from traditional, brick-and-mortar forms of instruction.

Instruction and content delivery can be categorized into four basic and different programs. The first and most prevalent instructional program is traditional instruction. Needham (2010) describes traditional instruction as a structured education program that focuses on face-to-face teacher-centered instruction, including teacher-led discussion and teacher knowledge communicated to students. Teachers use textbooks, lectures, and individual written assignments and students in the classroom generally receive a single, unified curriculum. Subjects are often individual and independent instead of integrated and interdisciplinary, particularly in secondary school (Needham, 2010). This program is considered a fully supervised, brick-and-mortar form of education.

The second and fastest growing educational program is technology-rich instruction. Staker & Horn (2012) describe technology-rich instruction as a structured education program that shares the features of traditional instruction, but also has digital enhancements such as: electronic whiteboards, broad access to internet devices, document cameras, digital textbooks, internet tools, and online lesson plans. The internet, however, does not deliver the content and instruction, or if it does, the student still lacks control of time, place, path, and/or pace (Staker & Horn, 2012). This has become increasingly popular, as a 2010 national study found 97 percent of (K-12) teachers had one or more computers located in the classroom every day, while 54 percent could bring computers into the classroom; internet access was available for 93 percent of the computers located in the classroom every day and for 96 percent of the computers that could be brought into the classroom; the ratio of students to computers in the classroom every day was 5.3 to 1 (Gray, Thomas, & Lewis, 2010).

Not widely used in K-12 schools, informal online learning is described by Staker & Horn (2012) as any time a student uses technology to learn outside of a structured education program. For example, students could play educational video games or watch online lectures on their own outside of any recognized school program (Staker & Horn, 2012). This is observed in formal education when students "Google the answer" or when their own interests and questions are explored without direct instructor guidance, or done at home in non-educational settings.

Full-time online learning, the final educational program, is growing in forward-thinking classrooms and many online charter schools. About 200 online charter schools are operating in the United States, serving about 200,000 students. Student enrollment in online charter schools is highest in Ohio, Pennsylvania, and California, each of which had more than 25,000 students enrolled in 2012–2013 (Gill, Walsh, Wulsin, Matulewicz, Severn, Grau, Lee, Kerwin, 2015). Full-time online learning is described as a structured education program in which content and instruction are delivered over the internet and the students do not attend a supervised brick-and-mortar location away from home, except on a very limited basis in some cases, such as for proctored exams, wet labs, or social events (Watson, Murin, Vashaw, Gemin, & Rapp, 2013).

Blended learning does not fall directly and/or completely under any of these four programs. Blended learning, by definition, is the combination, or "blend," of traditional, technology-rich, and online learning. This combination allows schools and teachers to take the best qualities and parts of these educational programs to best serve their students' needs. Furthermore, blended learning itself can be dissected and broken down into four specific learning models.

Current Models of Blended Learning

Most researchers in the educational technology field credit Staker & Horn with the guiding definitions of blended learning and the four instructional models from their work titled, "Classifying K-12 Blended Learning." This work, published in May 2012, has been used by many in the educational field as the key resource for understanding the different ways blended learning can be used and implemented in K-12 educational settings. The four instructional models that fall under the category of blended learning include the rotation model, flex model, self-blend model, and enriched-virtual model (Staker & Horn, 2012).

The rotation blended learning model is described as a program, within a given course or subject in which students rotate on a fixed schedule or at the teacher's discretion between learning modalities, and where at least one modality is online learning (Staker & Horn, 2012). Other learning modalities that are used in the rotational models include: small-group instruction, full-class instruction, group work activities and/or projects, individual tutoring, and pencil-and-paper assignments. Teachers are able to tailor the modalities to fit their subject areas and grade level. An example of this would be having students in a science classroom rotate through different modalities that include a lab station, whereas a math teacher might want to include a multiplication flash card game in their rotation.

Figure 1. Station-Rotation Model.

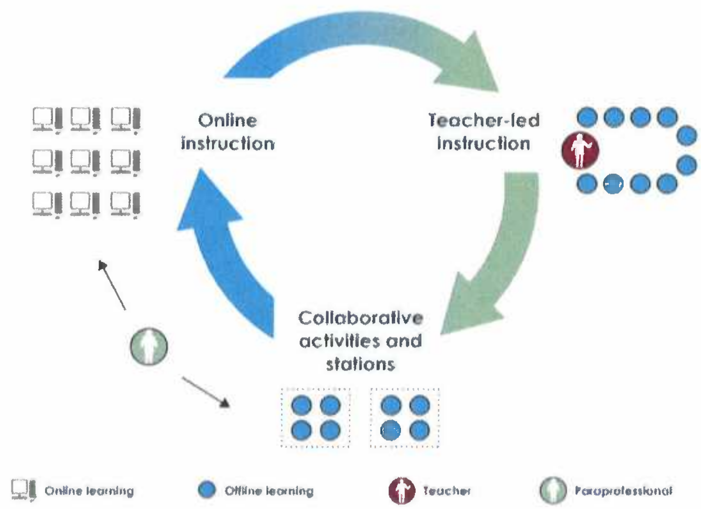


Figure 1. Station-Rotation model, KIPP LA Empower Academy. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

The flex blended learning model is a program in which content and instruction are delivered primarily by the internet, students move on an individually customized, fluid schedule among learning modalities, and the teacher-of-record is on-site (Staker & Horn, 2012.) The teacher's role in this model is face-to-face support and/or to supplement the online learning.

Figure 2. Flex Model.

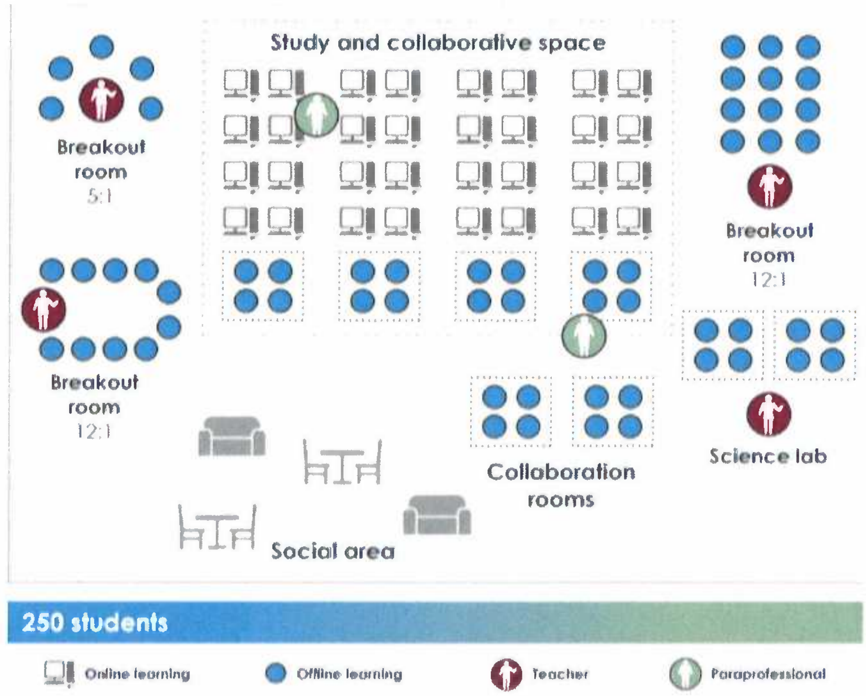


Figure 2. Flex model, San Francisco Flex Academy. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

The third blended learning model is called the self-blend model. In this model, students choose to take one or more courses entirely online to supplement their traditional courses and the teacher-of-record in the online teacher (Staker & Horn, 2012). The key to this blended learning model is that this is not a whole-school experience - only individual students or classes are enrolled - and they spend some time on campus and some time at home learning.

Figure 3. Self-Blend Model

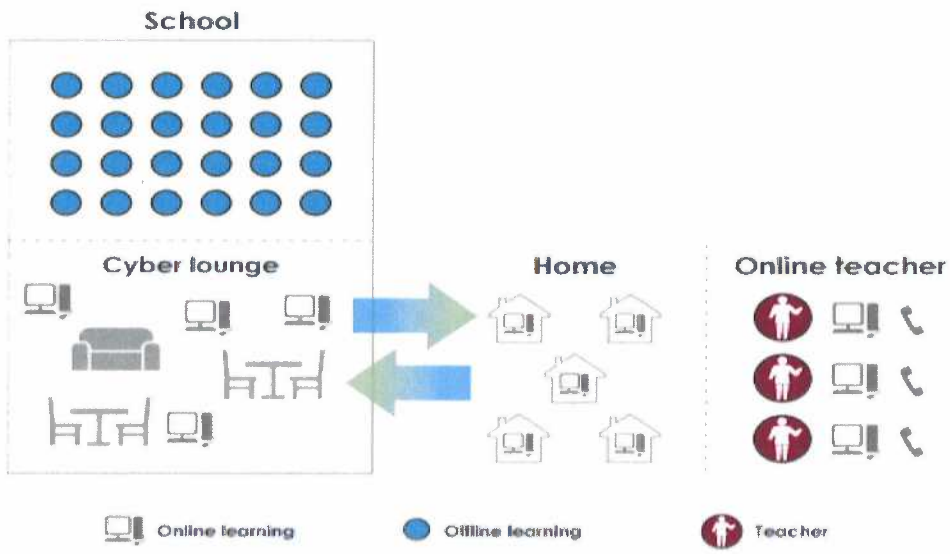


Figure 3. Self-Blend model, Quakertown Community School District. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

The final blended learning model is called the enriched-virtual model. The enriched-virtual model is a whole-school experience in which within each course (e.g., math), students divide their time between attending a brick-and-mortar campus and learning remotely using online delivery of content and instruction (Staker & Horn, 2012). Many schools currently using this model began as completely online schools, but want to provide services and support that would require a brick-and-mortar location.

Figure 4. Enriched-Virtual Model

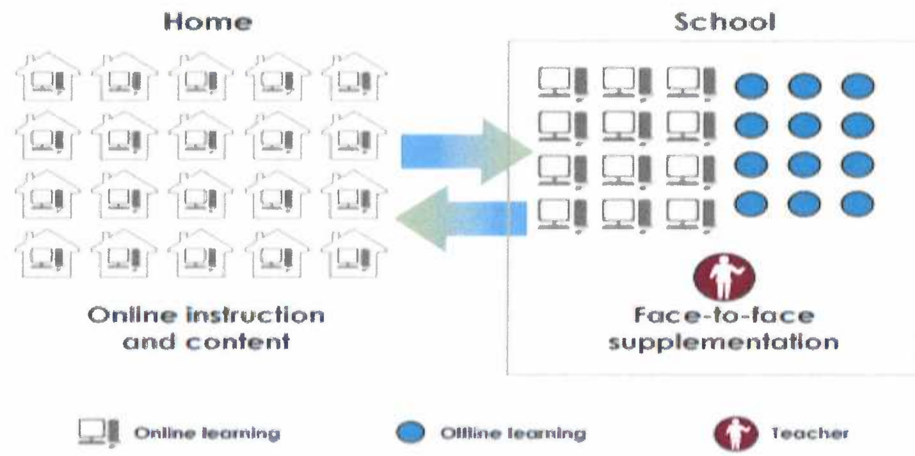


Figure 4. Enriched-Virtual model, Albuquerque eCADEMY. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

Current Sub Models of Blended Learning

More specifically, Horn & Staker describe four "sub models" that fall under the rotation blended learning model. These sub models differ in terms of students' control over time, place, path, and/or pace. The four sub-models (station rotation, lab rotation, flipped classroom, and individual rotation) are growing rapidly in different educational settings throughout the United States. Alliance College-Ready Public Schools, Arthur Ashe Charter School, KIPP Empower, and Rocketship Discovery Prep are just a few examples of top-notch private, public, and charter schools using these different sub-models and achieving high student academic success (Bernatek, Cohen, Hanlon, & Wilka, 2012).

Many Ohio schools and teachers are currently using the station rotation sub model. In the station rotation sub model, teachers set up different stations where students use different learning modalities, with at least one online learning station, and rotate through them. The rotation is determined by the teacher, but each station can be differentiated to meet the specific needs of individuals or groups of students. The teacher determines when and how the students rotate, which is the main difference between station rotation and individual rotation.

Figure 5. Station-Rotation Sub model

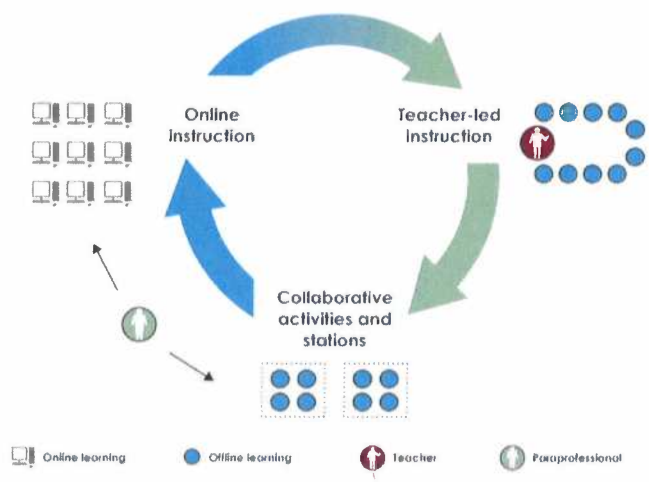


Figure 5. Station-Rotation sub model, KIPP LA Empower Academy. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

The second sub model of the rotation blended learning model is called individual rotation. This sub model is a rotation-model implementation in which within a given course or subject (e.g., math), students rotate on an individually customized, fixed schedule among learning modalities, at least one of which is online learning (Staker & Horn, 2012). This sub model allows for the most differentiation and customization for each individual student, based on their individual needs.

Figure 6. Individual Rotation Sub model

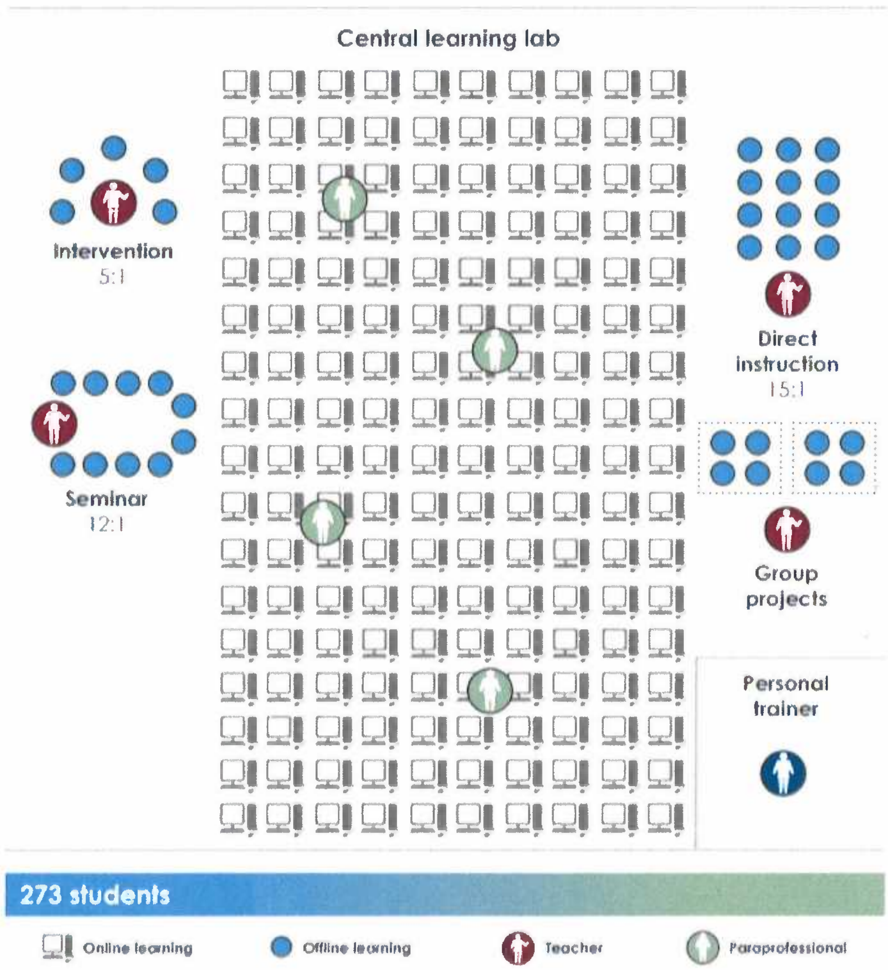


Figure 6. Individual-Rotation model, Carpe Diem Collegiate High School and Middle School Central learning lab. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

Flipped classroom is a rotation sub model where students rotate on a fixed schedule between face-to-face teacher-guided practice (or projects) on campus during the standard school day and online delivery of content and instruction of the same subject from a remote location (often home) after school (Staker & Horn, 2012). This is a very popular sub model in schools today. This sub model ensures that the students work on homework and projects, the more challenging aspects of school, with teacher support.

Figure 7. Flipped Classroom Sub model

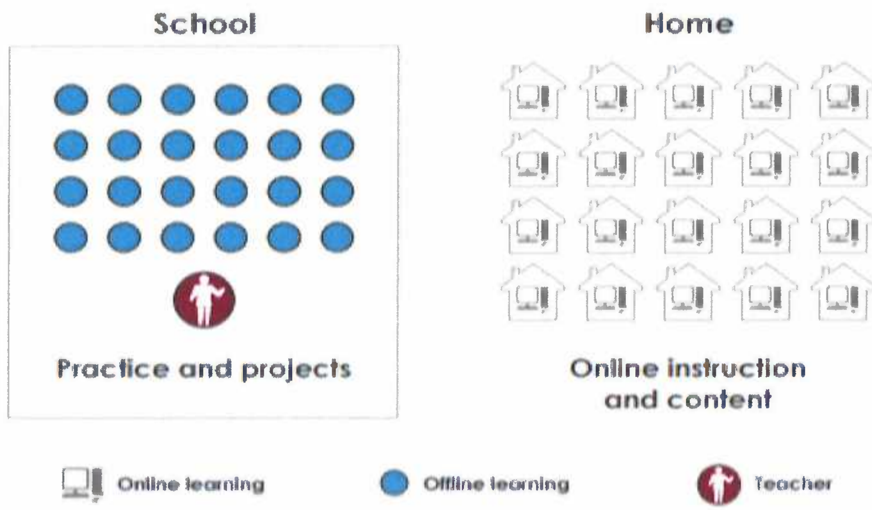


Figure 7. Flipped-Classroom model, Stillwater Area Public Schools. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

Lab rotation is the last sub model of rotation blended learning. Lab rotation is described as a rotation-model implementation in which within a given course or subject (e.g., math), students rotate on a fixed schedule or at the teacher's discretion among locations on the brick-and-mortar campus. At least one of these spaces is a learning lab for predominantly online learning, while the additional classroom(s) house other learning modalities (Staker & Horn, 2012). The key difference in this sub model is that students rotate through different locations on the campus, rather than within one classroom.

Figure 8. Lab Rotation Sub model

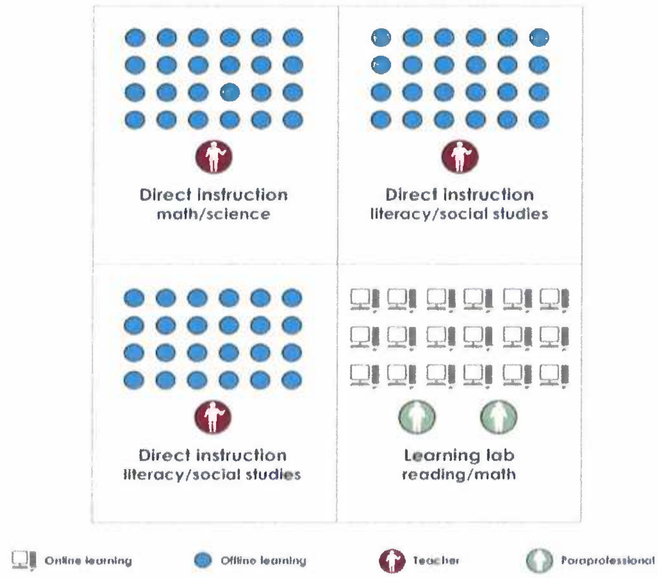


Figure 8. Lab-Rotation model, Rocketship Education. Adopted from "Classifying K-12 Blended Learning," by H. Staker and M.B. Horn, 2012. Copyright 2012 by Innosight Institute, Inc.

Why use Blended Learning Models?

Following the integration of face-to-face learning experiences and online learning, blended learning attracted great interest from researchers and educational institutions, who sought benefits from the advantages provided by both environments (Allen, Seaman, & Garrett, 2007). A meta-analysis conducted by the US Education Department (2009) reported the results of a comparison between blended learning, traditional face-to-face instruction, and online instruction in the K-12 setting and concluded that instruction with a combination of online and face-to-face elements had a larger advantage than purely online or traditional instruction (Means, Toyama, Murphy, Bakia, & Jones, 2009).

Blended learning has shown success at the postsecondary level as well. Research has shown that students enrolled in blended classes achieve higher test scores than their counterparts in fully online or face-to-face courses (Means et al., 2009.) Also, postsecondary faculty reported having their teaching invigorated by the experience of successfully implementing blended learning (Owston, Garrison, & Cook, 2006). Another study found the joint use of the online and face-to-face environments enabled the course instructor to arouse student interest, to manage time and course activities flexibly; to save time for course activities; to track student progress easily; and to engage in extensive interaction, collaboration, and communication with students. (Gedik, Kiraz, & Ozden, 2013)

Aside from positive student learning outcomes and positive instructor experiences, K-12 schools and teachers have turned to the implementation of blended learning to address the following goals: broadening access to instruction; facilitating small-group and one-to-one teacher-led instruction; serving students with diverse needs; providing more opportunity for productive practice; adding variety to instruction and enhancing student engagement; and supporting learning of complex, abstract concepts (Means, Toyama, Murphy, & Bakia, 2013).

Possibly the most interesting and important goal that schools and teachers try to address with blended learning models is meeting the needs of diverse learners. With the ever-changing state and federal legislation regarding diverse learners, including special and gifted education, it has become even more important for schools and teachers to focus on strategies focusing on serving and supporting students with diverse needs by differentiating. Differentiated learning options provide a variety of ways for students to engage with content & acquire knowledge, and can be tailored to student interests and academic skills (Tomlinson, 2001). Proponents of differentiated learning options argue that students differ in learning styles, knowledge & skills, and learning pace; and that students learn best when the instruction is aligned to their interests and needs (Tomlinson, 2000). Blended learning programs and models have the ability to effectively address the diverse needs of students in a K-12 setting.

Challenges Affecting Implementation of Blended Learning

Even with the many benefits noted in the field and supported by research, there are many challenges to note when schools and teachers are first trying to implement blended learning models. For example, school districts may not be financially capable of supporting the hardware, software, or network requirements for implementation. Also, a teacher may feel that he or she is not comfortable using technology tools. Ertmer (1999) describes these examples as "barriers to integrating technology," and explains how these barriers can be categorized as "first-order, extrinsic, or external" and "second-order, intrinsic, or internal."

External Factors Affecting Integration and Implementation

First-order or external factors affecting technology are described as those obstacles that are extrinsic to teachers (Ertmer, 1999). This includes equipment or technology tools, time, physical environments, technical support, and administrative and peer support during and throughout the integration and implementation process. Because these barriers are easy to measure and relatively easy to eliminate (once money is allocated), the majority of early integration efforts are focused on eliminating these barriers (Fisher, Dwyer, & Yocam, 1996). Schools and teachers must initially address these issues before blended learning models can be implemented and often these factors are out of the classroom teacher's control. A US Department of Education (2010) report indicates that external barriers have been reduced in many of our U.S. schools, but it will be a long time, if ever, before they are completely eliminated (U.S. DOE, 2010).

Internal Factors Affecting Integration and Implementation

Meaningful technology integration does not depend solely on technology-related (external) factors (Arntzen & Krug 2011; Ertmer 2005; Kimmons, Miller, Amador, Desjardins, & Hall 2015; Tondeur, Hermans, van Braak, & Valcke 2008). Teachers' personal pedagogical beliefs play a key role in their pedagogical decisions regarding whether and how to integrate technology within their classroom practices (Deng. Chai, Chin-Chung, & Min-Hsien, 2014; Inan, Lowther, Ross, & Stahl, 2010). These pedagogical beliefs are described by Ertmer (1999) as internal or second-order barriers.

Examples of internal or second-order barriers include: beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change (Ertmer, 1999). In other words, these internal barriers are deeply rooted in what the teacher believes his or her classroom, teaching, and students' learning looks like. Integrating and implementing something new, including things that involve technology, can challenge these beliefs and create internal conflict. Overcoming these barriers can be much more challenging than external barriers.

Results from an Ertmer, Ottenbreit-Leftwich, & York study (2006), suggests that the best way to bring more teachers on board is not by eliminating more first-order (external) barriers, but by increasing knowledge and skills, which in turn have the potential to change attitudes and beliefs.

Teacher Characteristics and Internal Factors

Teachers' characteristics may influence their attitudes and beliefs about using technology. Results from research studies suggest that characteristics such as preservice experiences, gender, and years of experience may influence teachers' perceptions of second-order or internal barriers. Wang et al.'s (2004) study suggests that preservice teachers that are exposed to successful technology integration experienced greater increases in judgements of self-efficacy for technology integration. Also, a teacher's gender was among the stronger independent predictors of exemplary computer-using technology (Becker, 1994). It was suggested that a higher percentage of males were considered exemplary technology users (Becker, 1994). Also, in regards to teachers' education levels, Ertmer et al.'s (2006) study suggests that postsecondary courses may not lead to exemplary technology use as gradually technology has become embedded in our lives. According to Ertmer et al.'s (2001) study exemplary technology use was most common among relatively less experienced teachers. Their study suggests that the difference may reflect recent changes in teacher training programs that now incorporate an increased emphasis on technology training (Ertmer et al., 2001). They also propose that newer teachers that are entering the workforce already have a high levels of computer competency (Ertmer et al., 2001).

Conclusion

Blended learning has shown, through numerous research and field studies, to be an effective learning model in today's K-12 classrooms. Teachers and schools are able to address many educational goals by implementing blended learning in their classrooms. Nevertheless, the issues and problems with blended learning do not come from its effectiveness, but from the implementation and integration challenges. Teachers and schools are facing many different issues regarding the successful implementation and integration of blended learning models. These issues can be categorized and addressed within two separate categories: external and internal. There is a need to analyze external and internal factors affecting the implementation of blended learning with more current research so that interested teachers and schools can successfully identify and address issues affecting implementation of this increasingly popular student learning model.

SECTION THREE

Method

Purpose of the Study

Many studies focus on the effectiveness in terms of student outcomes of blended learning. Instead, this study focuses on the barriers affecting implementation. To accomplish this, a previously published research study by Ertmer et al. (2006) was used as a model for this experiment (see Appendix A for a copy of Ertmer et al.'s survey). This previously published study was interested in examining the internal or intrinsic factors that affect the use of technology in the classroom. Ertmer et al (2006) received 25 survey responses from exemplary technology-using teachers and used those responses to investigate the perceptions of exemplary technology-using teachers regarding the factors that have most influenced their success, their perceptions of which intrinsic and/or extrinsic factors are more critical, and which teacher characteristics are significantly related to exemplary technology use. The current study focuses on factors affecting the implementation of blended learning. As the key difference between traditional instruction and blended learning is the use of technology, Ertmer et al.'s survey instrument matched the goals of this study, with minor revisions. Using the results of this survey will hopefully help schools and teachers successfully implement this increasingly popular student learning model by addressing the identified barriers. The research questions guiding this study include:

1. According to teachers that have implemented blended learning, what are the factors that they think have most influenced their success?
2. According to teachers that have implemented blended learning, which factors (intrinsic or extrinsic) are thought to be more crucial to implementation success?

3. Which teacher characteristics, if any, are significantly related to teachers' perceptions of blended learning implementation factors?

Methods

Participants in this survey research study were all K-12, public school teachers in the state of Ohio. They all have either previously used or currently use blended learning models in their classrooms. An online anonymous survey was attached to an email (see Appendix B for a copy of the survey used for this study) that was sent to known technology coaches, technology coordinators, technology integration specialists, and/or teachers that use or have used blended learning models. A total of 79 educators from 42 school districts were emailed the anonymous online survey. Seventy-five surveys were returned representing 13 school districts. Most of the school districts would be geographically described as located in Central Ohio and have a district funded technology instructional coach on staff. While these two things are similar between most of the districts, there are major differences between student enrollment, the percentage of students with disabilities, the percentage of students identified as economically disadvantaged, and district spending per pupil on classroom instruction (see Appendix C for a copy of the chart).

Procedures

I obtained a list of approximately 50 Ohio, public school technology coordinators', instructional coaches', and teachers' school email addresses. Using that list, I sent an email explaining the study, its purpose, and participation incentives. Educators were incentivized to respond to the survey and forward the survey to others who have also used or currently use blended learning models. Respondents were chosen at random to receive one of eight gift cards valued at $25-$50 each. Also, the technology coordinator or coach that had the most respondents from their district received a gift card valued at $100. This encouraged potential participants to respond to the survey.

I sent a follow-up email sent one week after the initial 50 emails were sent out. In an attempt to solicit more respondents, I identified more district technology specialists and emailed them via school district webpages. In all, I directly emailed 79 educators and invited them to participate in the study, with a second reminder a week later, and 75 responded. It is unknown how many educators actually received the email because I incentivized technology coaches to forward the email to educators that have or currently use blended learning. Some of the respondents were not directly contacted by the researcher and some technology coaches who were directly emailed did not personally respond but forwarded the email to educators that did respond themselves. With this in mind, it is not possible to calculate an exact response rate, but 11/79= 14% of the original 79 invitees participated.

The final sample of 75 responses included teachers, technology coordinators, and technology coaches that ranged in years of experience from one to 45 years, with a median of 17 years. The majority of respondents were female (n=54, 72%) and had completed their master's degree (n=62, 83%). Most respondents ranked themselves as having very high or high computer proficiency skills (n= 53, 71%). Also, with the growing trend toward lower computer to student ratios in Ohio public schools, many respondents had a 1:1 (computer: student) ratio in their classrooms (n=50, 67%).

Survey Instrument

The survey instrument used in the study was adopted from Ertmer et al.'s survey from their 2006 study. Ertmer et al.'s survey was developed after surveys previously used in similar studies (Bullock, 2004; Hadley & Sheingold, 1993; Iding, Crosby, & Speitel, 2002;

Lumpe & Chambers, 2001). The original survey used in that study was an 18-item survey, which included six demographic questions, two Likert-scale items (consisting of 20 subcomponents), eight open-ended questions, and one checklist item (consisting of nine sub compartments). The survey used in the present study was a slight variation of the survey used in Ertmer et al.'s study. The modified survey was created using a Google Form by the researcher. Questions that were added to the survey to meet the needs of this study include "length of typical class period in minutes (question 7)" and "what is the current device to student ratio in your classroom (question 11)." Two parts were omitted from the original survey, including "describe your most memorable or most useful professional experience," and the sub compartment "other:" from the Likert-scale items.

Data Analysis

The use of SPSS and Laerd Statistics are relied upon heavily in this study for the purpose of data analysis (SPSS 25.0, 2017; Lund & Lund, 2018). To answer the first research question, "what are the factors that they [the teachers] think have most influenced their success," a Friedman test was used to determine if there were differences between the different Likert-scale items. The medians for each Likert-scale item was found and a pairwise comparison was also used with a Bonferroni correction for multiple comparisons.

To answer the second research question, "which factors (intrinsic or extrinsic) are thought to be more crucial to implementation success," a paired-samples t-test was used to determine the differences between participants' perception of the importance of intrinsic factors vs extrinsic factors. The following Likert-scale items were considered to be intrinsic in nature: inner drive (drive), personal beliefs/attitudes (beliefs), commitment, confidence, previous success (success), and previous failures (failure). The factors that were categorized as extrinsic were: in-service professional development (PD), current setting (setting), opportunities to explore (time), preservice educational experiences (preservice), key influential people (people), support/encouragement from administration (support), support from parents (parents), support from other teachers (peers), class size (size), access to technical support (tech), access to internet (internet), access to hardware (hardware), and access to quality to software (software).

To answer the final research question, "which teacher characteristics, if any, are significantly related to teachers' perceptions of blended learning implementation factors," three tests were run to determine if there were any relationships between teacher characteristics and their perceptions of the importance of intrinsic factors. A Pearson's product-moment correlation test was conducted to determine if there was a potential relationship between teachers' years of experience and their perceptions of the importance of intrinsic factors. A one-way analysis of variance (ANOVA) was used to determine if there was a potential relationship between teachers' postsecondary degree, subject matter taught, perceived computer proficiency, or computer to student ratio and their perceptions of the importance of intrinsic factors. During the one-way ANOVA, it was determined that there was an outlier, teacher 43, and that subject was removed for this test only. Finally, a Mann-Whitney U test was used to determine if there were differences in perceptions of the importance of intrinsic factors between male and female teachers.

SECTION FOUR

Results

Introduction

A combination of descriptive and inferential statistics was used to answer the research questions. A Friedman test was used to answer the first research question and to determine if there were differences between the different Likert-scale items. The medians for each Likert-scale item were found and pairwise comparison was also used with a Bonferroni correction for multiple comparisons. A paired-samples t-test was used to answer the second research question and to determine the differences between participants' perception of the importance of intrinsic factors vs extrinsic factors. Three tests were run to determine if there were any relationships between teacher characteristics and their perceptions of the importance of intrinsic factors and answer to the third research question. A Pearson's product-moment correlation test was conducted to determine if there was potential a relationship between teachers' years of experience and their perceptions of the importance of intrinsic factors. A one-way analysis of variance (ANOVA) was used to determine if there was potential a relationship between teachers' postsecondary degree, subject matter taught, perceived computer proficiency, or computer to student ratio and their perceptions of the importance of intrinsic factors. Finally, a Mann-Whitney U test was used to determine if there were differences in perceptions of the importance of intrinsic factors between male and female teachers.

Comparison Between Factors

A Friedman test was run to determine if there were differences between each of the nineteen Likert-scale items (factors). Pairwise comparisons were performed (SPSS Statistics, 2017) with a Bonferroni correction for multiple comparisons. Certain items were statistically significantly different from other items, χ^2 (18) = 327.27, $p < .05$. Post hoc analysis revealed statistically significant differences between certain factors (see Table I & Table II; Appendix D).

Table I. Parents Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p *		Std. Test Statistic	Adj. p *
Parents-Failure	3.77	0.03	**Parents-Software**	-8.04	< 0.005
Parents-Size	-3.81	0.02	**Parents-Confidence**	8.18	< 0.005
Parents-People	4.70	< 0.005	**Parents-Drive**	8.27	< 0.005
Parents-Support	4.85	< 0.005	**Parents-Commitment**	8.50	< 0.005
Parents-PD	5.09	< 0.005	**Parents-Setting**	8.50	< 0.005
Parents-Peers	-5.35	< 0.005	**Parents-Hardware**	-8.99	< 0.005
Parents-Time	6.27	< 0.005	**Parents-Beliefs**	9.26	< 0.005
Parents-Tech	-6.50	< 0.005	**Parents-Internet**	-9.89	< 0.005
Parents-Success	7.16	< 0.005			

Note. *Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Table II. Preservice Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *		Std. Test Statistic	Adj. p. *
Preservice-PD	3.68	0.04	**Preservice-Drive**	6.86	< 0.005
Preservice-Peers	-3.95	0.01	**Preservice-Commitment**	7.09	< 0.005
Preservice-Time	4.86	< 0.005	**Preservice-Setting**	7.10	< 0.005
Preservice-Tech	-5.09	< 0.005	**Preservice-Hardware**	-7.58	< 0.005
Preservice-Success	-5.75	< 0.005	**Preservice-Beliefs**	7.86	< 0.005
Preservice-Software	-6.63	< 0.005	**Preservice-Internet**	-8.48	< 0.005
Preservice-Confidence	-6.78	< 0.005			

Note. *Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Table III. Medians of Extrinsic Factors

Extrinsic Factor	PD	Setting	Time	Preservice	People	Support	Parents
Median	4.00	4.00	4.00	3.00	4.00	4.00	3.00
Extrinsic Factor	Peers	Size	Tech	Internet	Hardware	Software	
Median	4.00	3.00	4.00	5.00	4.00	4.00	

Table IV. Medians of Intrinsic Factors

Intrinsic Factor	Drive	Beliefs	Commitment	Confidence	Success	Failure
Median	4.00	4.00	4.00	4.00	4.00	3.00

Intrinsic vs. Extrinsic Factors

A paired-samples t-test was used to determine whether there was a statistically significant difference between teachers' mean perception of the importance of intrinsic factors compared teachers' mean perception of the importance of extrinsic factors (see Table V). There were no outliers in the data, as assessed by inspection of a boxplot for values greater than 1.5 box-lengths from the edges of the box. The assumption of normality was not violated for either intrinsic or extrinsic factors, as assessed by Shapiro-Wilk's test ($p > .05$). Teachers' perception of the importance of extrinsic factors was less ($M = 3.61$, $SD = 0.55$) as opposed to their perception of importance of intrinsic factors ($M = 3.97$, $SD = 0.53$), a statistically significant mean difference of 0.36, $t\ (74) = 4.619$, $p < .0005$, $d = 0.66$, a moderate effect (see Table VI). This indicates that teachers perceived intrinsic factors to be significantly more important to the successful implementation of blended learning than extrinsic factors.

Table V. Means of Extrinsic & Intrinsic Factors

	Mean	N	Std. Deviation	Std. Error Mean
Extrinsic Factors	3.61	75	0.55	0.06
Intrinsic Factors	3.97	75	0.53	0.06

Table VI. Extrinsic-Intrinsic Paired Samples t-test

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	p (2-tailed)
				Lower	Upper			
Extrinsic-Intrinsic	0.36	0.67	0.08	0.51	0.20	4.619	74	0.000

Note. *Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05.

Teacher Characteristics vs. Perceptions of Intrinsic Factors.

A Mann-Whitney U test was run to determine if there were differences in perceptions of the importance of intrinsic factors between male and female teachers. Distributions of the engagement scores for males and females were similar, as assessed by visual inspection. Teachers' perceptions of the importance of intrinsic factors were not statistically significantly different between males and females, $U = 667.50$, $z = 1.192$, $p = .233$.

A one-way ANOVA was conducted to determine if there was a relationship between teachers' subject taught and their perceptions of the importance of intrinsic factors. Subjects were classified into five groups: core subjects (1) (science, social studies, math, and language arts; $n = 45$), special education (2; $n = 10$), specials (3) (technology, art, Spanish, physical education, etc.; $n = 13$), instructional coaches (4; $n = 5$), and support staff (5) (speech-language pathologists, counselors, etc.; n = 2). There were no outliers, as assessed by boxplot; data was normally distributed for each group, as assessed by Shapiro-Wilk test ($p > .05$); and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p > .05$). There was no statistically significant differences between subjects, $F\,(4, 70) = 1.785$, $p = .141$.

A one-way ANOVA was conducted to determine if there was a potential relationship between teachers' postsecondary degree level and their perceptions of the importance of intrinsic factors. Degree levels were classified into three groups: bachelor's degree (1) (n = 13), master's degree (2) (n = 60), and second master's degree and above (3) (n = 2). There were no outliers, as assessed by boxplot; data was normally distributed for each group, as assessed by Shapiro-Wilk test ($p > .05$); and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p > .05$). There was no statistically significant differences between subjects, $F\,(2, 72) = 1.008$, $p = .370$.

A one-way ANOVA was conducted to determine if there was a potential relationship between teachers' perceived computer proficiency and their perceptions of the importance of intrinsic factors. Proficiencies were classified into four groups: fair (1) (n = 1), average (2) (n = 21), high (3) (n = 36), and very high (4) (n = 17). There was one outlier, teacher 43, and was removed for the analysis. The data were normally distributed for each group, as assessed by Shapiro-Wilk test ($p > .05$); and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p > .05$). There was no statistically significant differences between subjects, $F\,(3, 71) = 6.419$, $p = .001$.

A one-way ANOVA was conducted to determine if there was a potential relationship between teachers' computer to student ratio and their perceptions of the importance of intrinsic factors. Ratios were classified into four groups: 1:1, personal computer to student (1) (n = 1), 1:1, class set (2) (n = 21), 1:2, computer to student (3) (n = 36), and > 1:2, computer to student (4) (n = 17). There were no outliers, as assessed by boxplot; data was normally distributed for each group, as assessed by Shapiro-Wilk test ($p > .05$); and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p > .05$). Teacher number 43 was excluded because the analysis does not permit a group with n=1. There was no statistically significant differences between subjects, $F(3, 71) = 0.823$, $p = .486$.

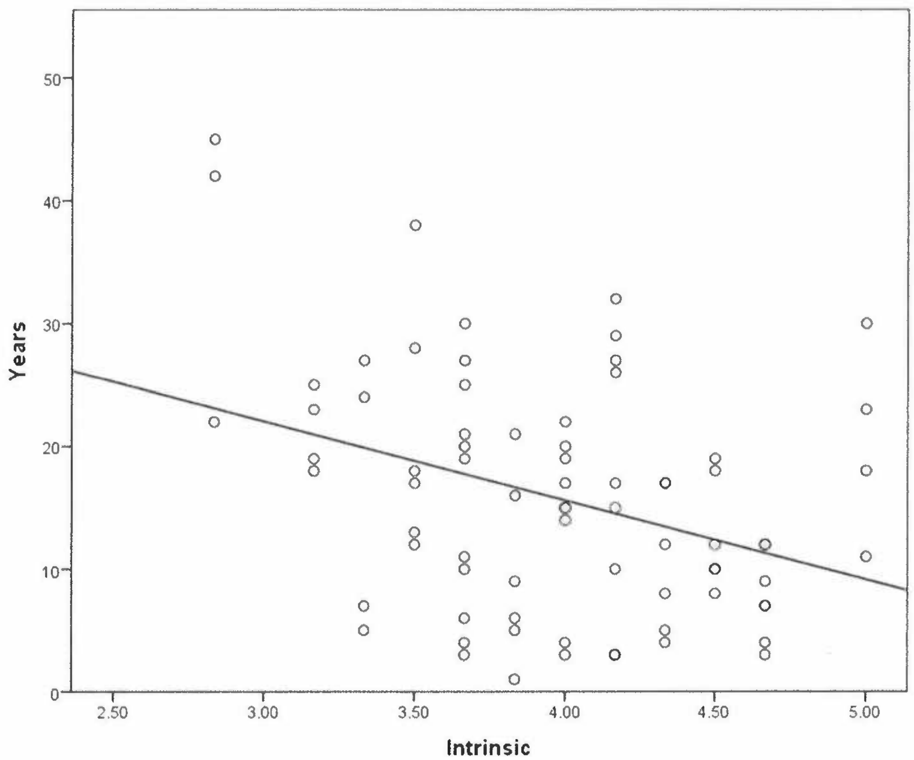
A Pearson's product-moment correlation was run to assess the relationship between teachers' years of experience and their perceptions of the importance of intrinsic factors. Preliminary analyses showed the relationship to be linear with both variables normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$), and there were no outliers. There was a statistically significant, moderate negative correlation between teachers' years of experience and their perceptions of the importance of intrinsic factors, $r(74) = -.355$, $p = .002$, with teachers' years of experience explaining 12.6% of the variation in their perceptions of the importance of intrinsic factors (see Table VII & Chart 1) .

Table VII. Pearson Correlation Between Years of Experience & Intrinsic Factors

[redacted]		Intrinsic Factors
Years of Experience	Pearson Correlation	-0.355**
	p (2-tailed)	.002
	N	75

Note. ** Correlation is significant at the 0.01 level (2-tailed)

Graph 1. Pearson Correlation Between Years of Experience & Intrinsic Factors



Note. $r(74) = -.355$, $p = .002$, with teachers' years of experience explaining 12.6% of the variation in their perceptions of the importance of intrinsic factors

SECTION FIVE

Discussion

The aim of this study was to determine and understand the barriers or factors that affect the implementation of blended learning. To accomplish this, it was important to understand what teachers who have implemented blended learning perceive as most influential to implementation. The research questions that guided this study include:

1. According to teachers that have implemented blended learning, what are the factors that they think have most influenced their success?
2. According to teachers that have implemented blended learning, which factors (intrinsic or extrinsic) are thought to be more crucial to implementation success?
3. Which teacher characteristics, if any, are significantly related to teachers' perceptions of blended learning implementation factors?

When answering the first research question regarding differences between the nineteen Likert-scale items, it was determined that there were significant differences between nine and at least one other factor. Using the results, it was determined that the extrinsic factors of parents, preservice, size, people, support, PD, peers, and time were all significantly different from at least one other item. Also, one intrinsic item, failure, was significantly different from nine other items. The factor labeled parents was statistically different than nine other factors. Also, the factor labeled preservice was statistically different than eight other factors. In this study, it can be concluded that support from parents and preservice educational experiences are perceived to have the least amount of influence on other factors of implementation. In contrast, previous research suggests that preservice teachers who are exposed to experiences that were related to successful technology integration experienced significantly greater increases in judgments of self-efficacy for technology integration (Wang et al., 2004). This previous finding by Wang et al. (2004), suggests that preservice experiences indeed should influence internal factors when integrating technology in such models like blended learning. Within this study, however, it was found that preservice experiences were significantly different from internal factors such as confidence, drive, commitment, and beliefs.

Results show that the factors of preservice, parents, size, and failure, all with a median of (Mdn=3), were least influential or important to the success of implementing blended learning. Out of the three factors with the lowest median, class size contradicts previous research. Becker (1994) suggested that "school district administrators could improve how computers are used by… (c) forming instructional classes and organizing access to computers so that computer-using teachers have favorable ratios of students to computers and relatively small class sizes." This shows that having a smaller class size could improve the implementation and use of technology in the classroom because the amount of computers needed in the classroom is reduced and small classes are easier for teachers to manage. Results also showed that the factor labeled internet was perceived to be in the most influential or important to implementing blended learning. Access to the internet for students at school is extremely important to the implementation of blended learning for obvious reasons; blended learning requires online instruction and to be "online" it requires connection to the internet. It is not surprising that most teachers perceived access to the internet as extremely influential to the implementation of blended learning.

When comparing the intrinsic and extrinsic factors, the results showed teachers perceived that intrinsic factors were statistically more significant to their implementation of blended learning than extrinsic factors, to a moderate effect. The results of this study suggest that internal factors such as: teachers' inner drive to spend personal time, personal beliefs and attitudes about technology and blended learning, commitment to using blended learning to enhance student learning, confidence and comfort using technology, previous successes with blended learning and technology, and previous failures were more influential than the factors that are considered extrinsic or external. These results support the work of previous research, such as Ertmer et al. (2006), "... exemplary technology-using teachers perceive as most strongly affecting their ability to be effective technology users are intrinsic factors such as confidence and commitment, as opposed to extrinsic factors such as resources and time." Teachers in this study had different extrinsic factors that could have been identified as possible barriers to the implementation of blended learning. This study shows, however, that teachers find the internal or intrinsic factors to be more important or influential to their implementation.

Teachers that participated in this study were of different genders, taught different academic subjects or had different roles within the school setting, and had different levels of postsecondary education. In this study, teachers' personal understandings of internal blended learning implementation factors were not determined to be influenced by a teacher's gender, subject, or education level. A teacher's gender, according to a previous study by Becker (1994), was among the stronger independent predictors of exemplary computer-using teaching. Though this study did not focus on exemplary computer-using teaching, it was determined within the limitations of this particular study that a teacher's gender does not influence their perceptions of internal blended learning implementation factors. Also, in regards to teachers' education levels, this study found similar results to Ertmer et al. (2006).

They suggested that the 'requirements' (postsecondary courses) have gradually evolved as technology has become more embedded in our lives, or that these types of characteristics are not essential to exemplary technology use (Ertmer et al., 2006). This shows that a teacher's with more postsecondary education do not necessarily have exemplary technology use because technology, over time, has become rooted in our everyday lives or that education levels simply do not correlate with technology use.

Teachers that participated in this study were also asked to rate their current level of computer proficiency. The scale ranged from fair (I can use applications with assistance), average (I use applications like word processing, spreadsheets, and/or basic Web searches), high (I can use computers without referring to manuals/instructions/ other help), to very high (i.e., I've written some programs/scripts or courseware, and/or could teach others how to use computers). Teachers' perceptions of internal factors were not determined to be influenced by their perceived level of computer proficiencies.

In many school districts across the country, there is a push to lower the computer to student ratio. In 2008, the national instructional computer-to-student ratio was 1:3.8 (Inan & Lowther, 2010). That means that for every 3.8 students in the nation, there is one instructional computer for use at school. Most teachers that participated in this study had a computer to student ratio less than 1:2; one computer for every two students. In this study, it was determined that the computer-to-student ratio at each teacher's school, ranging from 1:1 to greater than 1:2, had no influence on their perceptions of internal blended learning implementation factors. This supports other conclusions from this study, as this study and previous research found that extrinsic factors, such as computer-to-student ratio, did not influence their implementation of blended learning more than intrinsic factors (Becker, 1994; Ertmer et al., 2001).

Participants in this study ranged in years of experience. Results showed that years of teaching experience had a moderate, negative correlation with their perceptions of internal factors influencing the implementation of blended learning. This means that the longer a teacher has been teaching, the less they perceive internal factors as influential in their implementation of blended learning. Ertmer et al.'s (2001) study found that exemplary teachers in their study were relatively less experienced. There are many theories in previous studies as to why less experienced teachers would perceive internal factors more influential than external factors when implementing blended learning. Changes to teacher training programs, teaching prior to the widespread integration of technology in education, teacher's personalities, the way teachers themselves were taught, and exposure to successful technology integration as preservice teachers are all proposed explanations of why less experienced teachers would perceive internal factors more influential (Ertmer et al., 2001; Ertmer et al., 2006; Guha, 2003; Wang, Ertmer, and Newby, 2004).

Conclusions

This study investigated teachers' perceptions of internal and external factors that affect the implementation of blended learning. Within the constraints of this study, the following conclusions were drawn:

1. Preservice experiences had no influence on certain internal factors.
2. The least influential factors perceived to influence the implementation of blended learning include preservice experiences, parent support, class size, and previous failures.
3. The most influential factor perceived to influence the implementation of blended learning was access to the internet.

4. Internal factors were perceived to influence the implementation of blended learning more than external factors.
5. Teacher characteristics of gender, subject taught, education level, perceived computer proficiency, and computer-to-student ratio did not have a significant influence on perceived internal factors affecting implementation.
6. Years of experience and perceived internal factors affecting implementation were found to have a negative correlation.

Limitations

There were a few limitations to this study. Teachers that responded to this survey were mostly, 11 out of 13, from what can be geographically described as Central Ohio. All districts that responded to this survey currently have a version of a district funded technology integration coach, specialist, or coordinator. Also, it should be noted that all respondents have or are currently implementing blended learning. There were not any respondents that gave up or discontinued during stages of the implementation process. Finally, this research study focused on blended learning implementation as previous research studies discussed in this article focused on generic technology integration and exemplary technology-using teachers.

Implications for Practice and Future Research

As teachers, administrators, technology integration specialist, and school districts push to implement the successful learning model of blended learning, it is important to recognize the potential barriers or factors that affect its implementation and to understand what factors teachers who have implemented blended learning perceive to be the most influential to implementation. Within the framework and limitations of this study, the external factor of access to the internet and internal factors of inner drive, personal beliefs, commitment, confidence, and previous successes are perceived to have the most influence on teachers' implementation of blended learning. Therefore, these factors need to be addressed before implementation. Access to the internet in K-12 learning environments in the United States has increased over time. According to Gray et al.'s (2010) study, in K-12 schools in the United States, internet access was available for 93 percent of the computers located in the classroom every day and for 96 percent of the computers that could be brought into the classroom. For most teachers and districts, access to the internet is not a factor or barrier to implementation. The focus of proponents of blended learning and those who want to implement this model should instead focus their efforts on internal factors of inner drive, personal beliefs, commitment, confidence, and previous successes.

It was determined in similar studies (Ertmer, et al., 2006; Ertmer, 1999; Sheingold & Hadley, 1993) and concluded from results of this study, that internal factors or intrinsic beliefs are perceived to be the most influential to the implementation of blended learning. Addressing internal factors should be done first, before implementing blended learning. How to address these crucial factors has been theorized in previous studies. Sandholtz et al. (1997) and Zhao & Frank (2003) describe the importance of providing teachers with opportunities to reflect on their own beliefs within a supportive and collaborative environment and the ability for teachers to share successful technology integration experiences with their peers. This shows that there might be ways for proponents of blended learning to address internal barriers because it gives teachers an opportunity to reflect on their beliefs and find empowerment and encouragement from their peers. There is a need for future research to find others ways or suggestions to improve, grow, or overcome internal implementation factors. With this knowledge, teachers, technology coaches, and school districts can ensure higher implementation success rates of technology-based learning models, such as blended learning.

Having more years of teaching experience had a negative correlation with teachers' perceptions of the influence of internal factors. As previously stated, there are many explanations as to why researchers think that less experienced teachers would perceive internal factors more influential than external factors (Ertmer et al., 2001; Ertmer et al., 2006; Guha, 2003; Wang, Ertmer, and Newby, 2004). Alternative theories include: a teacher's willingness to change, how innovative they are, how creative they are, their influence from social media & educational blogs, and experiences with current educational research. Is it as simple as asking more experienced teachers their own personal thoughts and opinions regarding technology integration? In any case, there is a need for future research to investigate the reasons as to why less experienced teachers are more inclined to perceive internal factors more influential than external factors when implementing technology.

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APPENDIX A

Ertmer, Ottenbriet-Leftwich, & York (2006)

Exemplary Technology Integration Survey

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Appendix

Exemplary Technology Integration Survey

Thank you so much for your participation in our survey! Completing this survey should take approximately 10 minutes of your time.

Gender: ____ Male ____ Female

Number of years you have taught: ________

Subject you teach: ______________________________

Grade level you teach: ______________________________

Highest university degree completed: ____________________

Approximate number of additional credits beyond this degree: __________

If you could put your finger on one thing that influenced you the most in terms of integrating technology in your classroom, what would that one thing be?

____
____
____

Rate your current level of computer proficiency:

____ Very high (i.e., I've written some programs/scripts or courseware, and/or could teach others how to use computers)

____ High (I can use computers without referring to manuals/instructions/other help)

____ Average (I use applications like word processing, spreadsheets, and/or basic Web searches)

____ Fair (I can use applications with assistance)

What else could your school do to support your computer use in your classroom? ______________________________
____

Regarding computers and technology integration, what would you like to learn more about? ______________________________
____

Describe your most memorable or most useful professional development experience. ______________________________
____

If given a choice, in which types of professional growth opportunities do you prefer to participate? (Select all that apply.)

___ Workshops and seminars

___ Conferences

___ District or school sponsored courses

___ Online or Web-delivered professional development

___ One-on-one training with technology coordinator or technology aide

___ Group training with technology coordinator or technology aide

___ Release time for department or grade level planning related to technology

___ Release time for individual professional development related to technology

___ Other

If your answer included "other" for the previous question, please explain. ______________________________
____

If you could make a recommendation to other teachers who wanted to do more with technology in their classrooms, what recommendation would you make? ______________________________
____
____

Rate the following elements in terms of the influence they have had on your success in integrating technology in your classroom.

	1 Not Applicable	2 Not influential	3 Slightly influential	4 Moderately influential	5 Extremely influential
Inservice professional development (workshops, conferences, training, etc)					
Current setting—School environment allows for, or encourages, the integration of technology					
Inner drive—Willingness to spend extra or personal time on developing lessons that incorporate technology					
Personal beliefs/attitudes—Beliefs that technology is important to student learning					
Commitment to using computers to enhance student learning					
Time—Opportunities to explore or "play" with new technologies to incorporate into classroom					
Preservice educational experiences					
Key influential people—Mentors or other personal influences on your technology integration					
Confidence—How comfortable you are with technology use					
Previous success with technology					
Previous failure with technology					
Support/encouragement from administration					
Support from parents					
Support from other teachers or peers					
Class size					
Access to technical support					
Access to the Internet					
Access to hardware					
Access to quality software					
Other:					
Other:					

If your answer included "other" in the previous question, please explain. ______________________________

Are there any other experiences that have influenced your use of technology? ______________________________

Thank you for your time!

APPENDIX B

Technology Integration Survey

Technology Integration Survey

* Required

1. **Email address** *

2. **Gender** *

   Mark only one oval.

   - Female
   - Male
   - Prefer not to say
   - Other:

3. **Number of years you have taught** *

4. **Subject(s) you teach** *

5. **Grade level(s) you teach** *

6. **Highest university degree completed** *

7. **Approximate number of additional credits beyond this degree** *

8. **Length of typical class period in minutes** *

Technology Integration Survey

9. **If you could put your finger on one thing that influenced you the most in terms of integrating technology in your classroom, what would that one thing be?** *

10. **Rate your current level of computer proficiency:** *
Mark only one oval.

- ( ) Very High (i.e., I've written some programs/ scripts or courseware, and/or could teach others how to use computers)
- ( ) High (I can use computers without referring to manuals/ instructions/ other help)
- ( ) Average (I use applications like word processing, spreadsheets, and/or basic Web searches)
- ( ) Fair (I can use applications with assistance)

11. **What else could your school do to support your computer use in your classroom?** *

12. **What is the current device to student ratio in your classroom** *
Mark only one oval.

- ( ) 1:1 (one computer and/or tablet for every student that they can take with them/home)
- ( ) 1:1 Class Set (one computer and/or tablet for every student that stays in your room)
- ( ) Other:

13. **Regarding computers and technology integration, what would you like to learn more about?** *

14. **If given a choice, in which types of professional growth opportunities do you prefer to participate? (Select all that apply)** *
Check all that apply.

- [ ] Workshops and seminars
- [ ] Conferences
- [ ] District or school sponsored courses
- [ ] Online or Web-delivered professional development
- [ ] One-on-one training with technology coordinator, technology specialist, or technology aide
- [ ] Release time for department or grade level planning related to technology
- [ ] Release time for individual professional development related to technology
- [ ] Other: ____________________

15. **If you could make a recommendation to other teachers who wanted to do more with technology in their classrooms, what recommendation would you make?** *

____
____
____
____
____

Technology Integration Survey

16. **Rate the following elements in terms of the influence they have had on your success in integrating technology in your classroom.** *

Check all that apply.

	1 - Not Applicable	2 - Not Influential	3 - Slightly Influential	4 - Moderately Influential	5 - Extremely Influential
Inservice professional development (workshops, conferences, training, etc.)	☐	☐	☐	☐	☐
Current setting - School environment allows for, or encourages, the integration of technology	☐	☐	☐	☐	☐
Inner drive - Willingness to spend extra or personal time on developing lessons that incorporate technology	☐	☐	☐	☐	☐
Personal beliefs/attitudes - Beliefs that technology is important to student learning	☐	☐	☐	☐	☐
Commitment to using computers to enhance student learning	☐	☐	☐	☐	☐
Time - Opportunities to explore or "play" with new technologies to incorporate into classroom	☐	☐	☐	☐	☐
Preservice educational experiences	☐	☐	☐	☐	☐
Key influential people - Mentors or other personal influences on your technology	☐	☐	☐	☐	☐
Confidence - How comfortable you are with technology use	☐	☐	☐	☐	☐
Previous success with technology	☐	☐	☐	☐	☐
Previous failures with technology	☐	☐	☐	☐	☐
Support/encouragement from administration	☐	☐	☐	☐	☐
Support from parents	☐	☐	☐	☐	☐
Support from other teachers or peers	☐	☐	☐	☐	☐
Class size	☐	☐	☐	☐	☐
Access to technical support	☐	☐	☐	☐	☐
Access to internet	☐	☐	☐	☐	☐
Access to hardware	☐	☐	☐	☐	☐
Access to quality software	☐	☐	☐	☐	☐

17. **Are there any other experiences that have influenced your use of technology?**

- [ ] Send me a copy of my responses.

APPENDIX C

School District Information Chart

School District	*Location*	*Number of Students Enrolled*	*% Economic Disadvantage*	*% Students With Disabilities*	*Spending per Pupil on Classroom Instruction*	*District Funded Technology Instructional Coach*
Jonathan Alder Local Schools	Madison County Central Ohio	2, 138	23.0	11.0	$5, 944	Yes
Jefferson Local Schools	Madison County Central Ohio	1, 159	44.6	16.4	$6, 308	Yes
North Union Local Schools	Union County Central Ohio	1, 499	38.5	16.6	$6, 667	Yes
Pickerington Local Schools	Fairfield County Central Ohio	10, 227	25.2	14.7	$6, 520	Yes
Fairbanks Local Schools	Union County Central Ohio	1, 051	14.9	10.1	$6, 374	Yes
Westerville City Schools	Franklin County Central Ohio	14, 777	35.3	14.2	$6, 435	Yes
Independence Local Schools	Cuyahoga County Northeast Ohio	1, 071	7.9	10.4	$9, 430	Yes
Garaway Local Schools	Tuscarawas County Northeast Ohio	1, 158	33.4	14.4	$5, 650	Yes
Delaware City Schools	Delaware County Central Ohio	5, 500	34.9	15.2	$6, 020	Yes
Highland Local Schools	Morrow County Central Ohio	1, 832	36.1	13.6	$5, 216	Yes
Dublin City Schools	Franklin County Central Ohio	15, 472	11.4	11.2	$7, 995	Yes
Gahanna Jefferson Public Schools	Franklin County Central Ohio	7, 600	25.1	14.7	$7, 053	Yes
Groveport Madison Local Schools	Franklin County Central Ohio	5, 789	65.8	17.5	$5, 872	Yes

APPENDIX D

Implementation Factors & Differences from Other Factors

Failure Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *
Failure-Software	-4.27	<0.05
Failure-Confidence	4.41	<0.05
Failure-Drive	4.50	<0.05
Failure-Commitment	4.72	<0.05
Failure-Setting	4.73	<0.05
Failure-Hardware	-5.22	<0.05
Failure-Beliefs	5.49	<0.05
Failure-Internet	-6.12	<0.05

*Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Size Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *
Size-Software	-4.23	<0.05
Size-Confidence	4.38	<0.05
Size-Drive	4.46	<0.05
Size-Commitment	4.69	<0.05
Size-Setting	4.69	<0.05
Size-Hardware	-5.18	<0.05
Size-Beliefs	5.46	<0.05
Size-Internet	-6.08	<0.05

*Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

People Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *
People-Commitment	3.79	<0.05
People-Setting	3.80	<0.05
People-Hardware	-4.29	<0.05
People-Beliefs	4.56	<0.05
People-Internet	-5.19	<0.05

*Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Support Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *
Support-Commitment	3.64	<0.05
Support-Setting	3.65	<0.05
Support-Hardware	-4.14	<0.05
Support-Beliefs	4.41	<0.05
Support-Internet	-5.04	<0.05

*Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

PD Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *
PD-Hardware	-3.90	<0.05
PD-Beliefs	-4.18	<0.05
PD-Internet	-4.80	<0.05

*Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.

Peers Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *
Peers-Hardware	-3.64	<0.05
Peers-Beliefs	3.91	<0.05
Peers-Internet	-4.53	<0.05
*Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.		

Time Factor & Significant Differences from Other Factors

	Std. Test Statistic	Adj. p. *
Time-Internet	-3.62	0.05
*Asymptotic significances (2-sided tests) are displayed. The significance level is 0.05. Significance values have been adjusted by the Bonferroni correction for multiple tests.		