Transforming K-12 Rural Education through Blended Learning:

Barriers and Promising Practices

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Foreword

The need for effective blended learning environments — the best of online and face-to-face learning, coupled with tools driving continuous assessment of progress and personalization of content — is on the rise throughout the United States. *Transforming K-12 Rural Education through Blended Learning: Barriers and Promising Practices* specifically reports on the implementation of blended learning programs in the state of Idaho. Among its findings, three key takeaways are apparent.

First is the positive impact that blended learning has on those teachers who choose to incorporate emerging models of practice into their classroom environments. Clearly showcased in these results is a strong correlation between a teacher's ability to innovate and their enjoyment of teaching (as well as their self-efficacy/confidence). Educators in the field know that enjoyment of and confidence in their work are essential factors to retain great teachers in the profession.

Second is a correlation between the opportunity for self-pacing and the quality of a student's work and perseverance. Allowing students to work at their own pace provides them ownership of their education and enables them to achieve mastery on their individual timetable. It also reinforces for them the notion that persistence can lead to success throughout their learning.

Third is the importance of comprehensive teacher training for blended and online learning environments. The report emphasizes just how essential it is to identify and incorporate pedagogical strategies specific to blended and online teaching into teacher preparation for new models of education. Beyond merely "turning on a tool," educators must perceive and embrace the need to change their teaching style in order to engage and enrich each student's individual education more effectively.

Throughout all of our work lies an emphasis on the need for the field of K-12 blended and online learning to continue to conduct studies such as this in order to challenge, adapt and strengthen the initial drivers of innovation. We are extremely thankful for the partnership that has formed between Idaho Digital Learning Academy, Northwest Nazarene University, and iNACOL in this endeavor. We would like to extend a special thanks to Susan Patrick, President and Chief Executive Officer of iNACOL, and Dr. Cheryl Charlton, Chief Executive Officer of IDLA, as well as each organization's administrative teams, for their support on this project.

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Executive Summary

A STUDY INVESTIGATING THE IMPACT OF BLENDED LEARNING ON STUDENTS AND TEACHERS throughout the rural state of Idaho took place during the spring of 2013. Researchers with Northwest Nazarene University's Doceo Center for Innovation in Teaching and Learning (CITL) in partnership with Idaho Digital Learning Academy (IDLA) and the International Association for K-12 Online Learning (iNACOL) collaborated to send an electronic survey to 627 teachers in the state of which all had received at least some formal professional development in blended learning from IDLA. 145 (23%) responded. 86.9% of those taught in grades 9-12. 46 (31.7%) of respondents had used blended learning for a minimum of one semester.

The training from IDLA focused on five models of blended learning. Teachers who had not yet implemented blended learning in their classes answered questions regarding the barriers and reasons that they had not yet started. The teachers who had experience using blended learning used a variety of methods and were asked questions in the following 5 areas:

1. General uses
2. Student academic achievement
3. Student engagement
4. Communication
5. Teaching impact

On each of the 11 questions regarding general characteristics important to effective teaching at least 85% of the teachers responded that blended learning led to either better or the same outcomes on all questions. Highlights from each of the areas can be seen in the adjacent infographics.

Because there are a large number of variables in any student's education, it is difficult to pinpoint one factor impacting academic growth, but this study did show, via teacher-reported data, that allowing self-paced learning has positive correlations ($p<.001$) with: 1) quality of student work; 2) interest level of students during instruction; 3) general excitement of students during class; and 4) student perseverance.

In addition, a teacher's ability to be innovative had a positive correlation ($p<.001$) with: 1) an ability to provide 1:1 instruction; 2) self-efficacy/confidence; 3) ability to monitor student learning; and 4) enjoyment of teaching.

The implications of this research are far reaching in our understanding of the blended learning environment. Annually, large sums of money are being spent on technology in the classroom. This study helps us to understand the importance of systematic professional development for the teachers and the importance of using the technology for student-centered learning as opposed to teacher-centered learning.

Academic Ability

Percentage of teachers indicating student academic ability was either better or much better in their classes that used blended learning models

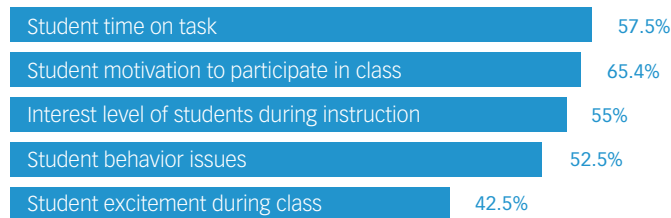|	
Student-led location of resources	67.7%
Student responsibility for learning	67.5%
Development of higher-level thinking skills	56.4%
Improvement in homework and test scores	53.8%
Student perseverance	52.5%
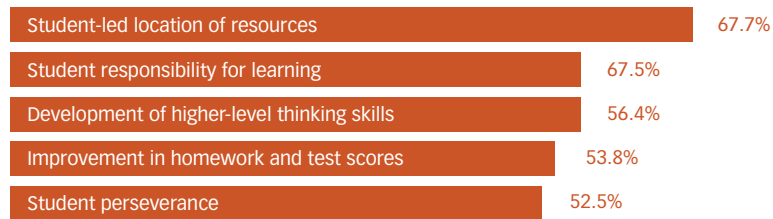
Student Engagement

Percentage of teachers indicating that overall work quality was either better or much better in their classes that used blended learning models

Student time on task	57.5%
Student motivation to participate in class	65.4%
Interest level of students during instruction	55%
Student behavior issues	52.5%
Student excitement during class	42.5%

Communication

61% of teachers indicated that communication between teacher and teacher was either better or much better in their blended learning courses

87% of teachers found communication between parent-teacher, student-student, and teacher-teacher the same or better after the use of blended learning

Teaching Impact

77.5% of teachers indicated that their ability to monitor student learning was either better or much better with blended learning

64.1% said that their ability to manage class was at least better or much better with blended learning

62.5% said teacher confidence and self efficacy was improved

Introduction

IN MAY 2013, RESEARCHERS WITH NORTHWEST NAZARENE UNIVERSITY'S DOCEO CENTER FOR INNOVATION IN TEACHING AND LEARNING (CITL) partnered with Idaho Digital Learning Academy (IDLA) and the International Association for K-12 Online Learning (iNACOL) to investigate the impact of blended learning on students and teachers throughout Idaho. Research involved sending an electronic survey to 627 teachers in the state who had attended training provided by IDLA on blended learning. The survey utilized was designed to branch, allowing those who had used blended learning in the classroom for a minimum of one semester to provide information on its impact in the educational environment while prompting those who had not, to indicate what barriers they had experienced to implementation.

Research revolved around investigating the impact of blended learning on the following aspects of the classroom environment:

1. Student mastery and comprehension of academic material
2. Providing targeted instruction/support to students
3. Self-paced learning
4. Communication between teachers, students, and parents
5. Student engagement
6. Teacher self-efficacy
7. General responsibilities of teachers (class preparation, monitoring learning, etc.)
8. Professional development

In addition to the impact of blended learning on these characteristics, teachers with first-hand experience in classroom implementation provided effective practice suggestions for those beginning the use of blended learning themselves.

This study used a post-reflection design in which teachers were asked after implementation to assess the impact of blended learning. This type of design has been shown to be as reliable as comparing pre and post assessments (English & Horowitz, 2002) and has the added advantage of not asking respondents to assess themselves and their students before implementing a new teaching strategy.

Background

Researchers have predicted by 2019, 50 percent of all high school courses will be delivered in an online format (Horn & Staker, 2011). Characterized as "disruptive innovation," the move to blended or online courses in K-12 schools holds the potential to revolutionize education by making it more accessible and individualized (Christensen, Horn, & Johnson, 2011; Horn & Staker, 2011). Blended learning is 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, and at least in part at a supervised location away from home (Horn & Staker, 2011). Blended learning allows for thoughtful reflection

and differentiated instruction across a diverse group of learners (iNACOL, 2013), and may be accepted more readily by parents, teachers, and students who continue to derive value in the face-to-face contact characteristic of traditional education (Wolpert-Gawron, 2011). Blended learning emphasizes a portion of the learning being accomplished through digital means, thus complimenting not replacing more traditional teaching methods.

Interest in blended education remains high, spurred partly by research offering support that blended learning is more effective than either online or face-to-face instruction on its own (Means et al., 2010; Nagel, 2009). Many K-12 schools are looking to embark on new ways of teaching and learning and are considering blended learning an option. In order to facilitate effective blended learning, the benefits of this teaching practice as well as the barriers to implementation must be understood. The benefits of blended learning are best articulated by those with first-hand experience using this technique in the classroom. Teachers, both those who are using blended learning and those who have considered its use but have not begun implementation are likewise in a unique position to provide insight into the barriers which will be encountered. This information is vital, as research indicates that when individuals view barriers they face in endeavors as impossible to overcome, they will not take steps forward even if they view these changes as beneficial to themselves or others (Prochaska & Prochaska, 1999).

The Idaho Digital Learning Academy (IDLA) has taken steps over the last decade to foster greater use of blended and online K-12 education in Idaho. IDLA was created in 2002 through the Idaho State Legislature to provide Idaho students with greater access to a wide variety of courses taught by highly qualified faculty (Idaho Digital Learning, 2013). IDLA was created as a "public school-choice learning environment, which joins the best technology with the best instructional practices" and to address the education of all Idaho students: traditional, home schooled, at-risk, and gifted students. The goal of IDLA is "to provide choice, accessibility, flexibility, quality, and equity in curricular offerings for students" in the state (Idaho Digital Learning, 2013).

The Idaho Digital Learning Academy provides high-quality public school education, aligned with state achievement standards, utilizing innovative e-learning methods of delivery. In addition, they have also made training of teachers, professional development, and policy creation a priority with IDLA being rated 3rd in the nation for online learning policy and practice. Creation of e-learning resources and services is critical for the establishment of a collaborative system for connecting and supporting teachers, districts, and the state. IDLA's expertise in e-learning creates an avenue by which high quality professional development can be offered (Idaho Digital Learning, 2013).

IDLA has noted benefits to students, school districts, and the state as a whole in the programs they facilitate (Idaho Digital Learning, 2013). These include:

Benefits of Blended and Online Learning for Students

- Provides an extensive selection of quality courses beyond what many school districts can offer.
- Creates flexibility in scheduling and length of course.
- Supplies access to student-centered, engaged faculty trained in e-learning practices.
- Extends learning to the digital world, available 24 hours a day, 7 days a week.
- Provides access to dual credit and advanced placement courses for college credit.
- Creates an opportunity to graduate early or recover credits.

Benefits of Blended and Online Learning for School Districts

- Adds 125+ courses including core, advanced placement, dual credit, foreign language, and selective courses.
- Offers sessions in 9-, 12-, and 16-week blocks.
- Adds 200+ highly-qualified faculty to school districts.
- Adds rigorous Idaho standards-based curriculum.
- Adds advanced placement and dual credit offerings.
- Provides another opportunity for credit recovery students.
- Alleviates scheduling conflicts.
- Reduces costs for medically homebound students.

Benefits of Blended and Online Learning for the State of Idaho

- Provides the most advanced technology with the best instructional practices.
- Offers school-choice option for all students in the state.
- Supplies equity in curricular offerings.
- Provides opportunities for dual credit in all Idaho school districts in partnership with Idaho universities.
- Establishes an infrastructure for e-learning in all school systems.
- Offers online professional development for education professionals, increasing timeliness of training and reducing travel costs.

The mission of the International Association for K-12 Online Learning (iNACOL) is to ensure all students have access to a world-class education and quality blended and online learning opportunities that prepare them for a lifetime of success. iNACOL is a non-profit organization focused on research; developing policy for student-centered education to ensure equity and access; developing quality standards for emerging learning models using online, blended, and competency-based education; and supporting the ongoing professional development of classroom, school, district and state leaders for new learning models.

The effort of organizations such as IDLA and iNACOL have made it possible to realize the tremendous promise online and blended learning holds for improving student learning and teacher practice. Horn and Stalker (2011), state, "Blended learning has the potential to revolutionize K–12 education in terms of quality and cost, as it allows for a fundamental redesign of the educational model" (p. 6). Student access to high quality education is one of the major goals both IDLA and iNACOL have supported through research, policy, and advocacy.

Northwest Nazarene University's Doceo Center for Innovation in Teaching and Learning is a member of the Doceo Learning Network established from a generous grant from the J.A. & Kathryn Albertson Foundation in 2013 for the purpose of improving student outcomes in P-16 classrooms through the effective use of technology. The Center seeks to research and explore the convergence of technological innovation with effective teaching strategies and then use the information gathered to develop and deliver training that will equip and build capacity of in-service and pre-service teachers.
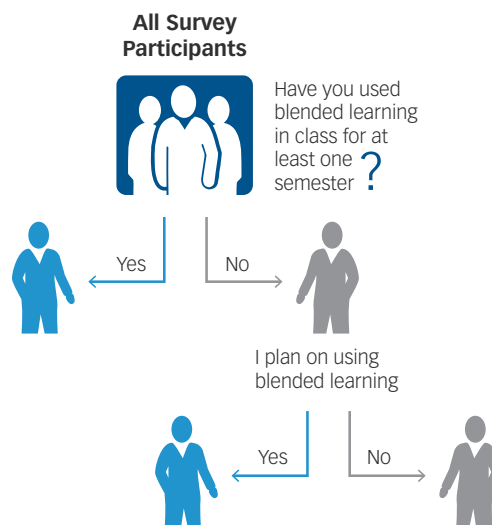
The three partnering institutions (IDLA, iNACOL, and NNU) understand the importance of the research questions in this study in each of their missions to improve the environment of education.

General Information and Demographics of Respondents

For a number of years, the Idaho Digital Learning Academy (IDLA) has been facilitating courses on blended learning attended by teachers throughout the state interested in implementing these practices in their classes. In order to investigate the impact blended learning has had on these students and teachers, a survey (see Appendix 1) was developed and electronically distributed in May 2013 to teachers who had received training through IDLA.

The survey utilized a branching design (see Figure 1) allowing those who had used blended learning for one semester or more to answer questions related to the impact of blended learning while those who had not, the barriers they faced in implementation. Researchers created the survey by examining existing literature on blended learning as well as listening to first-hand accounts of experienced K-12 teachers and administrators (Albrecht, 2006, Bart, 2010; IDLA, 2013; McElroy, 2012). The resulting tool was edited and piloted by members of the NNU, IDLA, and iNACOL research team.

Figure 1 – Major Survey Branch Elements

All Survey Participants

Have you used blended learning in class for at least one semester?

Yes   No

I plan on using blended learning

Yes   No

Research revolved around investigating the impact of blended learning on the following aspects of the classroom environment:

1. Student mastery and comprehension of academic material

2. Providing targeted instruction/support to students

3. Self-paced learning

4. Communication between teachers, students, and parents

5. Student engagement

6. Teacher self-efficacy

7. General responsibilities of teachers (class preparation, monitoring learning, etc.)

8. Professional development

In total, 627 teachers were asked to participate in the research project. These 627 teachers were selected because they have received at least some professional development on blended learning from IDLA over the last two years. Of these, 145 responses were received representing a response rate of just over 23%. While a higher response rate was desired, previous research indicates web surveys garner a lower response rate than paper-based surveys (Manfreda, Bosnjak, Berzelak, Haas, & Vehovar, 2008; Shih & Fan, 2008). Of the teachers who responded, 63.2% were female and 36.8% male. Nine percent were between the age of 20 and 29, 24.1% 30-39, 36.6% 40 to 49, and 30.3% were 50 or older. The teaching experience of those who responded ranged from less than a year to over 36 years with most between 6 and 20 years (see Table 1). Teachers were also asked what grade they taught as well as whether they work in urban or rural districts. The majority of respondents (86.9%) taught grades 9-12, with 7.6% grades 6-8, 4.8% K-5 and less than 1% early childhood education. Teachers from rural school districts represented the greatest percent of respondents (73.3%) while 23.4% identified themselves with urban districts. This is consistent with the actual percentage of rural districts in Idaho, which is 75% (Rural Education, 2013).

Table 1 – Teaching Experience of Responding Teachers

Years of Teaching Experience	Percent of Respondents
< 1	1.4%
1-5	21%
6-10	18.9%
11-15	21.7%
16-20	17.5%
21-25	10.5%
26-30	4.2%
31-35	4.2%
36-40	0.7%

Teachers were asked questions regarding the blended learning training they had received through IDLA, as it has been shown that training is an important factor impacting teacher practice (Duran, Brunvand, Ellsworth, & Sendag, 2012; Kazempour, 2009). At the time of this report, IDLA offered three classes for teachers on blended learning, two one-day courses facilitated face-to-face and a third referred to as Blended 101 which is online. Of those who responded to the survey, the percentage who had attended each of these classes is found in Table 2. When asked to what extent these individuals felt prepared to deliver blended learning in class, 7.7% indicated they were unprepared, 5.1% somewhat unprepared, 48.7% somewhat prepared, 23.1% prepared, and 15.4% highly prepared. These frequencies suggest while formal training helps in the preparation process, teachers will still face challenges when implementing blended learning. It also suggests that while training is needed prior to implementation, support should also be provided during the initial stages of implementation to help mitigate emerging challenges (Guskey, 2002; Moffett, 2000).

Frequency Data from Experienced Teachers

Teachers who responded to the electronic survey were asked to provide different information based on whether they had used blended learning in class or not. Of the 145 teachers to respond to the survey, 46 (31.7%) had used blended learning in class for a minimum of one semester. Considering all teachers who have received training from IDLA and who have also used blended learning techniques in their classroom for at least one semester, it is difficult to determine what response rate the 46 who had used blended learning represents, however, it is believed to be close to 80% of those who have taken professional development through IDLA and actively use blended learning.

Table 2 – Blended Learning Training of Respondents

	Completed	Did Not Complete
Day #1 Training	86.1%	13.9%
Day #2 Training	73.4%	26.6%
Blended 101 Online Training	34%	66% (10.4% in progress)

Those who had first-hand classroom experience with blended learning were asked to provide the frequency with which they used various forms of blended learning. A summary of the blended learning models discussed in training with teachers can be found in Appendix II. Although not every form of implementation may be summarized by one of these five models and not one model is best for every environment, these provide a comprehensive umbrella for most blended learning within the classroom. The table in Appendix II lists five blended learning models. One of these, Flex, involves students working independently for the majority of the day with the teacher using individual and small group instruction to meet specific student needs. The remaining four models involve student rotations. In Classroom Rotation, students are divided into groups with each group rotating between stations. A minimum of one of these groups involves students learning independently on the computer. The Lab Rotation model is similar, but in this implementation model students rotate between a computer lab where students learn independently and the classroom where group instruction occurs. The Flipped Classroom is the next model, and one that has become popular in recent years. In a flipped environment, students work on assignments or projects with teacher guidance during class and study content online outside regular class hours. The final rotation model referred to is Individual Rotation which is similar to Lab Rotation except that students rotate on an individually customized and fixed schedule.

In regard to the frequency with which these blended learning models were utilized, no one technique was used to a greater extent than another (see Table 3). In general, between 15% and 20% of respondents used each of the blended learning models daily. In contrast, each implementation model was not used by 40%-50% of those who completed the survey. This response can be explained a couple of ways. First, the majority of teachers who responded may view their implementation as not fitting any of these categories. Another explanation is that it takes time for teachers beginning blended learning implementation to learn how it can be made part of their daily teaching plan. A definition of each of these rotation models can be found in Appendix II.

Table 3 – Frequency of Blended Learning Implementation Models

	Never	Monthly	Weekly	Daily
Classroom Rotation	48.5%	15.2%	21.2%	15.2%
Lab Rotation	44.1%	14.7%	20.6%	20.6%
Flipped Classroom	41.2%	23.5%	20.6%	14.7%
Individual Rotation	42.9%	20%	20%	17.1%
Flex	51.4%	17.1%	11.4%	20%

Experienced teachers were also asked information related to the impact of blended learning on themselves as the teacher as well as their students. In general, questions were grouped into the following categories:

1. General Uses
2. Communication
3. Academic Ability
4. Student Engagement
5. Teacher-related Impacts

For each prompt, teachers were asked to indicate whether the teaching and/or learning characteristic was:

1. Much better before blended learning,
2. Better before blended learning,
3. The same before and after the use of blended learning,
4. Better after blended learning, or
5. Much better after blended learning.

The frequency of responses for each prompt can be found in Tables 4-8. In addition to the frequency with which each response option was chosen, these tables include the percent of teachers who responded that the characteristics was better or much better after blended learning as well as the percentage of respondents who indicated that the characteristics was the same or better when blended learning was utilized in the classroom. In relation to general uses, teachers were asked about the impact blended learning had on the ability of students to master important concepts and increase student higher-level thinking skills, as well as how the teaching technique impacted the ability of the teacher to assess student comprehension, obtain and use student achievement data, provide individualized instruction/interventions, provide immediate feedback to parents, provide resources to those who missed class or were struggling, allow self-paced learning, differentiate instruction based on ability level or student learning styles, and meet the needs of special student populations (ESL or special education). As can be seen in Table 4, 60%-70% of responding teachers felt as though these characteristics of education were better or much better after the implementation of blended learning. This percentage was highest for allowing self-paced learning (89.4%), providing resources to those who miss class or are struggling (82%), obtaining and using student achievement data (74.4%), differentiating instruction based on student ability level (71.8%), and providing immediate feedback to parents (71.8%). The only response where at least 50% of respondents did not feel that blended learning led to better outcomes was the prompt related to blended learning improving the teacher's ability to assist students with special needs (43.6%). As there can be a fear among educators and parents that emerging teaching practices may harm students (O'Dwyer, Russell, & Bebell, 2004; Hollingworth, Mansaray, Allen, & Rose, 2011), it is encouraging to see more than 85% of teachers felt that blended learning led to either better or the same outcomes on all of these general characteristics important to effective education (see Table 4).

It is well documented that communication between students, parents, and teachers is important to academic success (Graham-Clay, 2005). Teachers responding to the survey were asked about the impact of blended learning on teacher-parent, teacher-student, student-student, and teacher-teacher communication. These results can be found in Table 5. A lower percentage of teachers found blended learning to improve these communication levels, with the exception of teacher-student communication where 61.5% of responses indicated it was better or much better following implementation of blended learning. Only 18% of teachers found blended learning to improve teacher-teacher communication and 28.2% teacher-parent communication. However, at least 87% of teachers found these forms of communication to be at least the same or better after using blended learning (see Table 5) showing that nearly 9 out of 10 respondents felt as though implementation of blended learning did not harm and perhaps improved

all of these communication types important for effective education. The fact that fewer teachers did not find blended learning to be useful in improving teacher-parent and teacher-teacher communication is interesting as others using similar technology have noted these benefits (Blau & Hameiri, 2010; Gallego Arrufat & García-Beltrán 2010; Perkins & Pfaffman, 2006).

In terms of academics, teachers were asked to indicate what impact blended learning had on student mathematical and reading ability, reading comprehension, scores on homework and tests, willingness to take responsibility for their own learning, perseverance, the ability of students to locate resources on their own, and the development of higher-level thinking skills. As can be seen in Table 6, with the exception of mathematics (26.3%), over 50% of those who responded indicated blended learning improved these measures of academic ability with 67.5% and 66.7% of responses indicating that blended learning improved students' willingness to take responsibility for their own learning and locate their own resources, respectively. This finding is significant as a student's ability to be a self-regulated learner has been shown to improve their effectiveness, efficiency, productivity, and academics (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Wolters, 2013). Again, if one considers academic ability staying the same OR improving with blended learning, each response had at least 80% support. While math was the lowest rated academic category, it should be noted that nearly 60% of teachers marked "does not apply" suggesting that fewer individuals used blended learning techniques in this subject.

Student engagement has been shown to be an important characteristic associated with success in school (Carroll & O'Donnell, 2010; High & Andrews, 2009; Mo & Singh, 2008). In this study, teachers were asked to give their impression on how blended learning influenced student engagement by answering prompts on its impact on student behavior issues, time students were on task, the interest level of students during instruction, student motivation to participate in class, student attendance, student excitement during class, student eagerness to complete work outside of class, and the overall quality of student work. Table 7 summarizes the results of this section. While no single response showed much higher positive marks than the others, with the exception of student attendance (12.5%), between 42.5% and 57.5% of teachers indicated that blended learning had a positive impact on these factors. This implies that in approximately half of the classrooms where it was used, the teachers of those classes felt that blended learning improved a variety of indicators of student engagement. Although not as high, 12.5% of respondents indicating blended learning improved student attendance is encouraging considering the personal impact to students of greater time in class and the impact attendance has on school funding. Again, extending this measure to teachers who felt that blended learning was equivalent to or better in these measures compared to before its implementation, responses were greater than 90% with the exception of time students were on task (87.5% the same or better as before the use of blended learning).

The final structured section of the survey for teachers experienced in blended learning related specifically to impact on teaching. Prompts in this section included how blended learning influenced teacher confidence/self-efficacy, enjoyment of teaching, ability to manage class, time to lesson plan, time to prepare for class, time required for student assessment, the ability to meet national/state/local objectives, and ability to innovate, build community in class, and provide 1:1 instruction. Teacher self-efficacy and job satisfaction is vital to effective education. Research has demonstrated that teachers with greater self-efficacy positively impact student motivation and achievement (Mojavezi & Tamiz, 2012), and that teachers with greater self-efficacy have a heightened commitment in relation to integration of technology into instruction (Lin & Lu, 2010). The enjoyment of teaching has also been shown to be a major factor in teacher retention, with self-efficacy being a strong contributor to enjoyment (Cook & Engel, 2006).

Results of this section of the survey can be found in Table 8. The prompts that teachers felt improved the most with blended learning were the ability to be innovative (82%), the ability to monitor student learning (77.5%), and the ability to provide 1:1 instruction (74.4%). Other items that teachers felt were better with blended learning included the ability to manage class (64.1%) and teacher confidence/self-efficacy (62.5%). All of these characteristics of teaching have been shown to be important to effective education (Dunn, Airola, Lo, & Garrison, 2013; Frost, 2012; Jonassen

& Grabowski, 2011; Marzano & Marzano, 2003, Mojavezi & Tamiz, 2012). The fact that so many teachers felt blended learning improved these aspects is noteworthy. With the exception of time to lesson plan (35.9%) and time required to prepare for class (38.4%), over 50% of teachers indicated that blended learning improved all of the teaching related characteristics indicated in the survey. As with earlier segments of the survey, when "the same before and after blended learning" is included with the percentage who felt improvements occurred, these percentages increase to nearly 90% or more for most prompts (see Table 8).

Table 4 – General Uses

	Much better before	Better before	The same before and after	Better after	Much better after	Percent better or much better	Percent the same or better
Students master important concepts	5.1%	5.1%	33.3%	43.6%	12.8%	56.4%	89.7%
Increase student higher-level thinking skills	5.1%	2.6%	30.8%	43.6%	17.9%	61.5%	92.3%
Assess student comprehension	7.7%	2.6%	20.5%	38.5%	30.8%	69.3%	89.8%
Obtain and use student achievement data	5.1%	2.6%	17.9%	38.5%	35.9%	74.4%	92.3%
Provide individualized intervention	7.7%	2.6%	23.1%	33.3%	33.3%	66.7%	89.7%
Provide immediate feedback to parents	5.1%	0%	23.1%	33.3%	38.5%	71.8%	94.9%
Provide resources to those who missed class or struggle	5.1%	0%	12.8%	20.5%	61.5%	82%	94.9%
Allow self-paced learning	2.6%	0%	7.9%	44.7%	44.7%	89.4%	97.4%
Differentiating-ability level	5.1%	5.1%	17.9%	43.6%	28.2%	71.8%	89.7%
Differentiating-learning styles	5.1%	2.6%	23.1%	38.5%	30.8%	69.3%	92.4%
Meeting needs for special needs (Special Ed, ESL)	10.3%	5.1%	41%	23.1%	20.5%	43.6%	84.6%

Table 5 – Communication

	Much better before	Better before	The same before and after	Better after	Much better after	Percent better or much better	Percent the same or better
Teacher-Parent	5.1%	2.6%	64.1%	28.2%	0%	28.2%	92.3%
Teacher-Student	5.1%	2.6%	30.8%	35.9%	25.6%	61.5%	92.3%
Student-Student	5.1%	7.7%	48.7%	25.6%	12.8%	38.4%	87.1%
Teacher-Teacher	5.1%	5.1%	71.8%	15.4%	2.6%	18%	89.8%

Table 6 – Academic Ability

	Does Not Apply	Much better before	Better before	The same before and after	Better after	Much better after	Percent better or much better	Percent the same or better
Math	57.9%	0%	0%	15.8%	18.4%	7.9%	26.3%	42.1%
Reading	13.2%	5.3%	0%	28.9%	31.6%	21.1%	52.7%	81.6%
Reading Comprehension	13.2%	5.3%	0%	28.9%	34.2%	18.4%	52.6%	81.5%
Scores on HW/tests	5.1%	5.1%	2.6%	33.3%	33.3%	20.5%	53.8%	87.1%
Students take responsibility for own learning	2.5%	7.5%	7.5%	15%	40%	27.5%	67.5%	82.5%
Student perseverance	0%	7.5%	2.5%	37.5%	37.5%	15%	52.5%	90%
Students locate own resources	0%	7.7%	0%	25.6%	46.2%	20.5%	66.7%	92.3%
Develop higher-level thinking skills	5.1%	5.1%	2.6%	30.8%	38.5%	17.9%	56.4%	87.2%

Table 7 – Student Engagement

	Does Not Apply	Much better before	Better before	The same before and after	Better after	Much better after	Percent better or much better	Percent the same or better
Student behavior issues	0%	5%	2.5%	40%	45%	7.5%	52.5%	92.5%
Time students on task	0%	7.5%	5%	30%	50%	7.5%	57.5%	87.5%
Interest level of students during instruction	0%	5%	5%	35%	40%	15%	55%	90%
Student motivation to participate in class	0%	2.6%	5.1%	35.9%	43.6%	12.8%	56.4%	92.3%
Student attendance	0%	5%	2.5%	80%	10%	2.5%	12.5%	92.5%
Student excitement during class	0%	5%	5%	47.5%	37.5%	5%	42.5%	90%
Student eagerness to complete work outside of class	0%	5%	2.5%	50%	37.5%	5%	42.5%	92.5%
Overall quality of student work	0%	5%	5%	42.5%	37.5%	10%	47.5%	90%

Table 8 – Teacher-related Issues

	Much better before	Better before	The same before and after	Better after	Much better after	Percent better or much better	Percent the same or better
Teacher confidence/self-efficacy	5%	5%	27.5%	50%	12.5%	62.5%	90%
Enjoyment of teaching	5.1%	2.6%	38.5%	41%	12.8%	53.8%	92.3%
Ability to manage class	5.1%	5.1%	25.6%	43.6%	20.5%	64.1%	89.7%
Time to lesson plan	10.3%	23.1%	30.8%	23.1%	12.8%	35.9%	66.7%
Time required to prepare for class	10.3%	20.5%	30.8%	20.5%	17.9%	38.4%	69.2%
Time for student assessment	7.7%	5.1%	28.2%	33.3%	25.6%	58.9%	87.1%
Ability to meet national/state/ local objectives	5.1%	0%	41%	35.9%	17.9%	53.8%	94.8%
Monitor student learning	5%	2.5%	15%	42.5%	35%	77.5%	92.5%
Ability to be innovative	7.7%	0%	10.3%	48.7%	33.3%	82%	92.3%
Ability to build community in class	7.7%	7.7%	41%	33.3%	10.3%	43.6%	84.6%
Ability to provide 1:1 instruction	7.7%	0%	17.9%	59%	15.4%	74.4%	92.3%

Noteworthy Correlations and Implications

In addition to response frequencies, researchers looked at data for significant correlations between study variables. Spearman's rho correlations were run between each question in the study to determine what relationships teachers perceived between blended learning and the teaching/learning environment. Although these correlations represent data obtained entirely from teacher self-reported data, the research team felt that those with first-hand experience in the classroom use of blended learning would be able to provide important information about the connections between these elements.

Important correlations evident in the study can be found in Table 9. Allowing self-paced learning, my ability to be innovative, providing resources to those who missed class or struggle, and student ability to locate resources on their own were all items that teachers felt improved or greatly improved with the use of blended learning, 89.4%, 82%, 82%, and 66.7%, respectively. Considering the high percentage of teachers who indicated blended learning improved these characteristics, other factors teachers saw as being correlated to these items provide insight into potential impacts of blended learning on the teaching and learning environment.

Allowing self-paced learning was positively correlated with overall quality of student work, interest level of students during instruction, my ability to be innovative, student perseverance, scores on homework and tests, general excitement of students during class, my ability to monitor student learning, and my overall enjoyment of teaching. With

the exception of my overall enjoyment of teaching (p=.018), all of these factors were significant at p≤.01. My ability to be innovative was found to be positively correlated with differentiating instruction for learners at different ability levels, overall quality of student work, interest level of students during instruction, my overall self-efficacy/confidence as a teacher, my overall enjoyment of teaching, general excitement of students during class, development of higher-order thinking skills, my ability to provide 1:1 instruction, and my ability to monitor student learning. All of these correlations were positive with p-values less than .001. The ability to provide resources to those who missed class or are struggling was found to be correlated to a number of items including students taking responsibility for their own learning, time students are on-task during class, interest level of students during instruction, motivation of students to participate in class, general excitement of students during class, my overall enjoyment of teaching, my ability to provide more 1:1 instruction, student ability to locate resources on their own, my ability to be innovative, my ability to monitor student learning, my overall self-efficacy/confidence as a teacher, student perseverance, student behavioral issues, student eagerness to complete homework/complete assignments out of class, my ability to manage my class, and student attendance. With the exception of my ability to manage my class and student attendance (p=.012), all of these correlations were significant with p-values less than .005. Finally, a student's ability to locate resources on their own was highly correlated (p≤.002) with student perseverance, students taking responsibility for their own learning, interest level of students during instruction, overall quality of student work, general excitement of students during class, and time students are on task during class.

Table 9 – Correlation of Teacher and Student Factors

Variable 1	Variable 2	r-value	p-value
Allowing self-paced learning	Overall quality of student work	.526	.001
	Interest level of students during instruction	.484	.002
	My ability to be innovative	.469	.003
	Student perseverance	.448	.005
	Scores on homework and tests	.447	.003
	General excitement of students during class	.424	.008
	My ability to monitor student learning	.412	.010
	My overall enjoyment of teaching	.386	.018
My ability to be innovative	Differentiating instruction for learners at different ability levels	.698	.000
	Overall quality of student work	.692	.000
	Interest level of students during instruction	.682	.000
	My overall self-efficacy/confidence as a teacher	.682	.000
	My overall enjoyment of teaching	.651	.000
	General excitement of students during class	.646	.000
	Development of higher-order thinking skills	.639	.000
	My ability to provide 1:1 instruction	.638	.000
	My ability to monitor student learning	.544	.000
Providing resources to those who miss class and/or who are struggling	Students taking responsibility for their own learning	.600	.000
	Time students are on-task during class	.582	.000
	Interest level of students during instruction	.577	.000
	Motivation of students to participate in class	.561	.000
	General excitement of students during class	.537	.000
	My overall enjoyment of teaching	.535	.001
	My ability to provide more 1:1 instruction	.531	.001
	Student ability to locate resources on own	.526	.001
	My ability to be innovative	.487	.002
	My ability to monitor student learning	.484	.002
	My overall self-efficacy/confidence as a teacher	.478	.002
	Student perseverance	.466	.003
	Student behavioral issues	.457	.003
	Student eagerness to complete homework/complete assignments out of class	.456	.004
	My ability to manage my class	.400	.012
	Student attendance	.397	.012
Student ability to locate resources on their own	Student perseverance	.673	.000
	Students taking responsibility for their own learning	.654	.000
	Interest level of students during instruction	.577	.000
	Overall quality of student work	.552	.000
	General excitement of students during class	.529	.001
	Time students are on task during class	.490	.002

Suggestions by Experienced Teachers

Teachers who had implemented blended learning were asked to provide suggestions for those just beginning a similar project of their own. The research team coded these responses for themes and analyzed the frequency with which they appeared. The results of this analysis can be found in Table 10.

As can be seen in Table 10, the most frequently expressed suggestion by those experienced in blended learning is to expect it to take a good amount of time, particularly during the initial implementation period. This needs to be understood both by the teachers planning to use blended learning as well as administrators. The next two most frequently expressed comments were that when beginning blended learning, there are initial struggles that one must persevere through and that the best course of actions is to build materials/lessons as you go. The struggles with implementation may be on the part of the teacher or student, but multiple respondents indicated that the benefit after the initial difficult stages is well worth the effort. The suggestion of building as you go supports the first theme regarding time constraints. Trying to plan an entire year or even semester, particularly over the summer when most teachers are not on contract, can be overwhelming. A better approach is to develop several lessons and related materials to get started but develop the rest during the school year. Respondents also indicated that students may be able to help in the process. The final theme evident in the open responses related to seeking formal and informal training. Experienced teachers found it beneficial to take courses on blended learning to get implementation ideas and other information to make the process as smooth as possible. Teachers also expressed the value of collaborating with others who have used blended learning to learn from their experience.

Previous research (Werth & Werth, 2013) indicates that in technology implementation efforts, the three most common barriers teachers face are access to technology, time to learn and experiment with the technology, and training. This triad of barriers, technology, time, and training all must be addressed for successful implementation. The themes in Table 10 address two of these three barriers, time and training. The themes also include an important internal characteristic which may play a large role in success of failure in any endeavor, perseverance.

Table 10 – Suggestions of Experienced Teachers

Theme	Frequency
Implementing blended learning takes time	47.8%
One must persevere through initial struggles	26.1%
Build lessons/materials as you go	26.1%
Seek formal and informal training	21.7%

Feedback from those who had not used blended learning

As the survey used in this research included branching, a separate set of questions was presented to teachers who had been to a training course on blended learning but who indicated that they had not begun using the technique. The first question asked of these teachers was the reason why they had not started using blended learning. Answer choices included an option indicating that the teacher did not see the benefit of blended learning, that he/she saw the benefit of blended learning but saw barriers that could not be overcome, or that they simply had not begun the implementation process. The results of this question can be found in Table 11. Only 5.1% of those responding indicated that they had not implemented blended learning because they did not see its benefit. On the other hand, nearly 40% viewed insurmountable barriers to implementation and 57.1% just had not begun implementation.

In terms of blended learning usage, it is encouraging that only 5% of those who responded did not see a benefit to this teaching practice. Space was provided for those who marked this choice to provide information on why they did not see it as beneficial. Of those who chose to leave responses, the main reasons for holding this view relate to a question as to whether younger students can be self-directed long enough to effectively use blended learning or a belief that blended learning does not add value beyond other techniques already being utilized in class.

Table 11 – Blended Learning NOT Used in the Classroom

Theme	Frequency
I do not see the benefit of blended learning	5.1%
I think it is beneficial but there are barriers I can't overcome	37.8%
I want to use blended learning but haven't yet	57.1%

Teachers who indicated that they viewed a benefit to blended learning but saw great barriers to its implementation were asked to provide additional information about these barriers. In this section of the survey, respondents could indicate that time, administrative support, technology, or access was a barrier. In addition to marking any or all of these, a respondent could also write in barriers that did not fit into these categories. As can be seen in Table 12, the most frequently indicated barrier to implementation was time (45.5%), followed by technology availability (31%), training (24.1%) and administrative support (6.2%). This result again supports the contention that time, technology, and training are the three primary barriers that must be addressed for successful implementation efforts. While only 6.2% of respondents indicated that administrative support was an issue, previous research indicates that leadership in educational change is critical (Waters, Marzano, & McNulty, 2004).

Several themes are evident in the "other" category of barriers provided by survey respondents (see Table 12). Lack of training following implementation is indicated, as is access to technology, both at school and in the home of students. Other barriers include time constraints, availability of blended learning material such as lessons and activities, and sufficient interest on the part of students. What remains unknown about many of these barriers are if they represent true barriers or perceived barriers. Lack of student interest is an interesting dynamic as it is commonly held that students are eager for classes that integrate greater levels of technology and online components. These comments, however, may relate to the particular course or elective being offered as opposed to the delivery modality. Regardless of whether the barriers expressed by teachers actually exist or represent a perceived barrier (i.e. student lack of access to technology), this dynamic endangers success of technology implementation efforts and must be addressed.

Table 12 – Barriers Preventing Use of Blended Learning in the Classroom

Theme	Frequency
Time	45.5%
Administrative Support	6.2%
Technology	31%
Training	24.1%
Other · After training support · Consistent classroom training · Lack of Interest/Course Cancelled · Spending my limited time developing curriculum · Availability of sufficient devices for student use · Student capabilities and home internet access · The cost-benefit ratio seems too high · Still in start-up phase · Students not signing up for it · Sources of material · Not useful in current school · Must have minimum class size · Used in elementary music but not higher level performance groups · I have 10 - 20 classes to teach per semester · Currently a counselor but support it ALL the way! · Computer restrictions · Age of students · Age appropriateness for my students · I would try it out with teachers as students, but licensing costs don't allow for more users of BH · I've decided I like meeting with students full time	

When asked at what point respondents expect to begin using blended learning, 22.2% indicated that they would not implement the practice (see Table 13). Of those who do plan to begin use of blended learning, the majority indicated that they plan to do so the next academic year (2013/2014). Others expressed that they would do so when specific barriers such as time or technology access were addressed, or that they plan to use blended learning in a limited fashion the upcoming year. These results suggest that Idaho can expect a growing number of classroom teachers to be using blended learning methodology in 2013/2014 and beyond. In addition, a number of teachers are interested in blended learning and have the internal motivation to begin once perceived barriers are addressed. The interest and internal motivation of teachers evident through this question and other portions of the research is important to note, as work by previous researchers suggest that these internal characteristics are most important to the success of implementation efforts (Ertmer, 1999) indicating that internal barriers represent a greater deterrent to the success of implementation efforts than external barriers.

Table 13 – Do you anticipate using blended learning?

Theme	Frequency
No	22.2%
Yes (if yes, when) • possibly next year (n=23) • ASAP (n=3) • Not sure / unknown (n = 3) • Maybe, depends on assignments/jobs in the future (n=2) • As soon as time is compensated and we have technology • I will use materials as supplement • I am partially using it, but it is difficult sometimes • Over the next several years • Future • Not interested • Possibly when my kids have access to their own computer • When I am comfortable with it • When I have time for more training and implementation • When I understand how to bring it down to a level that is applicable to students • When it becomes better supported by the community (money)	77.8%

Two final open-ended questions were asked of teachers who indicated they were not using blended learning. The first, "Why don't you anticipate using blended learning?", as asked of those who stated they would not use the practice in the future. The responses of those who answered this question can be found in Table 14. Not surprisingly, lack of time (27.8%), technology (16.7%), and training (16.7%) were among the most frequently cited reasons. Also indicated was a lack of support (16.7%) and lack of student interest (11.1%). Indicated less frequently were questions about how blended courses would impact school funding, concern of technological problems, an absence of administrative policy and procedure related to blended learning and the school/district level, concern over general lack of funding statewide, and the belief that other techniques are more effective.

Table 14 – Reasons a Teacher May Not Use Blended Learning

Response	Frequency
Lack of time	27.8%
Lack of technology	16.7%
Lack of training	16.7%
Lack of support	16.7%
Lack of student interest	11.1%
Questions on how these courses impact school funding	5.6%
Concern about technical issues	5.6%
Lack of administrative policy & procedure	5.6%
Lack of statewide funding for efforts	5.6%
Belief other techniques are more effective	5.6%

The second question asked those who were not using blended learning to provide any thoughts or suggestions for the research team to consider. Following thematic analysis, the most commonly expressed comments related to a lack of time (50%), the need for training (27.8%), and technology access (16.7%). Teachers also indicated that the learning management system (LMS) utilized for blended learning could be more user-friendly (11.1%) and that support at times was a concern (8.3%). A summary of respondent comments can be found in Table 15. As can be seen, teachers had many suggestions about how to implement blended learning more easily. Supporting previous portions of this study, these responses in general provide a foundation for the argument that most teachers are prepared internally for integration of blended learning techniques in class and view external barriers (time, technology access, training, etc.) as the factor delaying its use.

Table 15 – Suggestions/thoughts Given by Teachers Not Using Blended Learning

Suggestion/Thought	Frequency
Time is a concern	50%
Additional training is needed	27.8%
Technology access is an issue	16.7%
The LMS could be more user-friendly	11.1%
Support is needed	8.3%
Other: · Technology problems are a concern · Time is being spent on high-stakes testing · One must be tech savvy · Will the state support long-term funding? · I don't want to put material in one specific LMS · I don't want to give away material that some providers online will pay for · I need help getting started · Use of blended learning needs to be covered in teacher prep programs · Are students who often procrastinate going to succeed? · Use of blended learning should be a student's choice · Training should be in multiple small blocks with time in between for practice · Many sample classes to review would be helpful · Don't over emphasize technology. You need a good teacher and good technology. · What is the incentive for teacher to use blended learning? · Training is needed in specific content areas (i.e. math) · Can the process be broken down into smaller parts and taught to mastery so that blended learning seems less complicated? · I plan to use it · With Common Core State Standards courses should be ready and usable · Thanks for bringing this to our classrooms	

Summary of Findings

The research described above sought to investigate the use of blended learning in the classroom, including its perceived benefits and the barriers to implementation for teachers. A survey was created which included several branching points. Teachers with first-hand experience using blended learning for at least one semester were asked about its impact on teaching and student learning. Respondents who had not used blended learning were asked for information regarding what barriers they have faced to its use in the classroom.

In general teachers experienced in blended learning found it to be a great benefit in allowing self-paced learning, providing resources to students who missed class or are struggling, obtaining and using student achievement data, providing feedback to parents, and differentiating instruction. This instructional technique also was shown to be particularly beneficial in facilitating teacher-student communication, fostering students taking responsibility for their own learning and locating resources themselves, improving student behavior issues, the time students are on task, and student motivation. Finally, teachers indicated that the use of blended learning improved their ability to be innovative, assisted them in monitoring student learning, and allowed greater opportunity to provide 1-on-1 instruction. Strong correlations were found between allowing student self-paced learning, a teacher's ability to be innovative, providing resources to those who miss class and/or who struggle, and students' ability to locate resources on their own and important educational outcomes such as student interest level, perseverance, motivation, time on task, excitement, attendance and a teacher's overall enjoyment of teaching (see Table 9).

Those who had utilized blended learning cautioned that those beginning a similar endeavor to expect the project to take time and that there will be initial struggles that need to be persevered through. These individuals suggested that teachers build lesson material as they go and seek formal and informal training whenever possible. A number of respondents indicated that while it may seem time-consuming and difficult at first, the benefits later greatly outweigh the cost.

Of those who had not implemented blended learning, only 5% indicated this was because they did not see the benefit of blended learning. Nearly 40%, however, responded that they foresaw barriers that could not be overcome. In comparison, close to 60% anticipated using blended learning in the future (see Table 11). When asked to indicate their perceived barriers, the greatest issue indicated was time, followed by technology, training, and administrative support (see Tables 12, 14 & 15).

While based entirely on teacher perception, these findings are significant in that they come directly from those who have the greatest impact on the success of a blended learning initiative, the classroom teacher. Findings suggest that blended learning is beneficial to a large number of characteristics important for effective teaching and learning. Moreover, on almost every characteristic asked, 90% or more teachers found blended learning to be equal to or better than previous techniques used in class. Although a larger sample size confirming these results would be of benefit, these findings, along with the strong correlations teachers indicated between items regarding blended learning improving and other important characteristics of effective education, suggest that blended learning implementation leads to positive outcomes for both the students and teacher.

This study also provides important information on the barriers to the use of blended learning. If blended learning is to be successful, teachers must have the appropriate technology, training, and time to spend on the initiative. The training must not cease in the time prior to implementation, but should continue through the initial phases of implementation when struggles are likely greatest. While these three barriers are the most commonly indicated by both those who have and have not begun using blended learning in class, administrative support is still a vital element of success.

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Appendix I

Blended Models from Idaho Digital Learning Academy

Model	Overview	Details
Flex	Students move on an individually customized, dynamic schedule among various learning modalities. The majority of instruction is delivered through online content and teachers plan face-to-face support on a flexible and adaptive basis.	Academic: All students learn independently for the majority of the day; specialized teacher pull small groups of students for direct instruction or collaborative work based on need.
		Staffing: Multiple lab specialist/teacher's aide to oversee the learning center; requires fewer teachers than a traditional classroom.
		Physical Space: Large space to house enough computers for multiple grade levels/classes at once and numerous small group pull-out rooms.
Rotation Options		
Classroom Rotation	Students rotate on a fixed schedule among classroom-based learning modalities. At least one of the stations is an online learning station.	Academic: Teacher creates small groups of students to effectively differentiate instruction; whole group instruction is used occasionally.
		Staffing: One teacher per classroom, however, class sizes are typically larger due to the small atmosphere the model creates.
		Physical Space: Utilizes traditional classrooms.
Lab Rotation	Students rotate on a fixed schedule between their classroom and a learning lab-which is used predominately for online learning.	Academic: All students learn independently at the lab for a block of time, while whole group instruction remains in the classroom.
		Staffing: Lab specialist/teacher's aide to oversee the lab.
		Physical Space: Need a large space to house enough computers for an entire class.
Flipped Classroom	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.	Academic: Students learn content and instruction online while practice is done in the classroom.
		Staffing: One teacher per classroom.
		Physical Space: Utilizes traditional classrooms.
Individual Rotation	Students rotate on an individually customized, fixed schedule among learning modalities, at least one of which is online learning. An algorithm or teacher(s) sets individual student schedules.	Academic: All students learn independently at the lab for a block of time, while whole group instruction remains in the classroom.
		Staffing: Lab specialist/teacher's aide to oversee the lab while teachers are in breakout rooms.
		Physical Space: Needs large space.

Adapted from Clayton Christensen Institute's Blended Models