Advancing Blended Learning in K-12 Education

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Abstract

Technology innovations over the years have helped evolve and infuse blended learning more and more into different environments in education and business. It is being utilized in trainings, teaching and learning concepts. Blended learning has become a popular mode of delivering instruction and it's well used in higher education and corporations, but minimally in K-12 education. This paper addresses how higher education and corporations utilize blended learning and the effects on learners, and how K-12 education can utilize these methods to advance blended learning for students. This paper will also investigate challenges such as measuring learner outcomes, cost, implementation and technology associated with deploying blended learning contrasted with the desired results. Based upon the aforementioned investigations, it is concluded that more consistent research is needed on blended learning and measuring learning outcomes in the K-12 setting.

Keywords: *Blended learning, flipped classrooms, training, learning outcomes, student engagement.*

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Blended learning, according to Garrison and Kanuka (2004), is the "integration of classroom face-to face learning experiences with online learning experiences" (p. 96). No longer is the school building the sole place where learning takes place as it can be expanded outside of the brick and mortar due to advancements in technology and the internet. Blended learning involves taking the traditional teaching strategies used in the classroom to enhance the learning process (Osguthorpe & Graham, 2003). When using multiple delivery methods and technology tools combined, it may help to engage peer-to-peer conversations to facilitate the completion of assignments or jobs (Singh, 2003) if blended learning is developed adequately.

Over the years there has been an increase in the use of computer tools used within in K-12 and higher education and in corporations. Technology advances in software and classroom management systems: BlackBoard, Moodle, and Sakai; and tools: IPADs and computer notebooks have increased the opportunities to use blended learning in the education and business environment. Instructors now can strike a balance using technology online combined with face-to-face instruction.

When looking at the different environments between business and education, the corporate world has adopted blended learning in the workplace before it started filtering into the world of education. Higher education has been accepting and utilizing blended learning before K-12 education. This is evident as research is being done since there is more research material and data for higher educational institutions compared to K-12 education. Higher education has helped evolve collaboration inquiry via online learning in the classroom (Garrison, 2009). K-12 needs to implement blended learning to achieve results realized by corporations and higher education despite the perceived challenges.

More traditional methods of teaching involved face-to-face instruction with the learners in a classroom and the teacher as the main facilitator. Blended learning involves a mix of face-to-face with online instruction with the use of technology or what is called an asynchronous teacher, where the student is online, but not at the same time as the instructor, to complete the work. Of course blended learning can also involve a synchronous teacher where the student and teacher are online at the same time. The diagram, *figure 1* below, adopted from Power (2010), shows how blended learning fits into instruction compared with other versions.
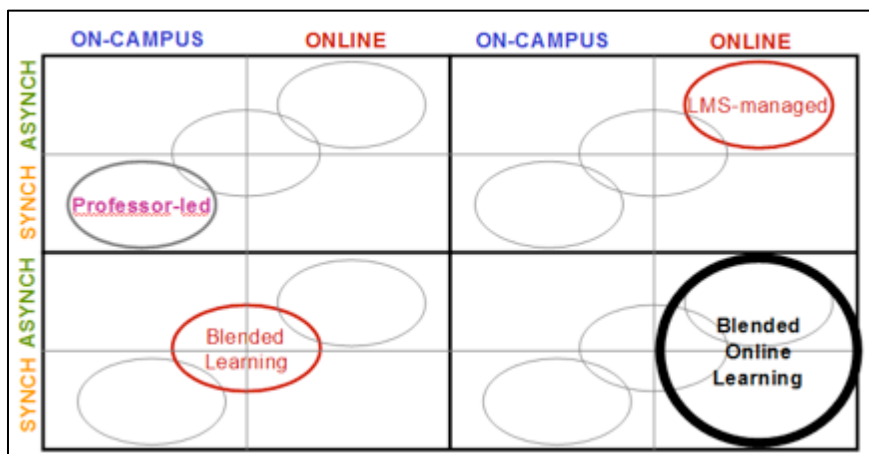

Figure 1. Adopted from "Redesigning Online Learning for International Graduate Seminar Delivery," by M. Power and N. Vaughn, (2010) *Journal of Distance Education*, 24 (2), p. 24.

Educational vendors have been utilizing the blended learning model when working with educators in regards to professional development. One such vendor, Pearson, offers a virtual online program called SIOP (Sheltered Instruction Observation Protocol) to learn about the best instructional strategies for English language learners. This training would utilize a "live" face-to-face meeting online with the option of having an instructor providing services face-to-face at the educational facility.

Blended Learning in Higher Education

Blended learning is more prevalent in higher education compared to K-12 education. Colleges and universities are utilizing software and tools such as BlackBoard and Moodle as classroom management systems to offer blended learning to their students. Future trends indicate that blended learning will continue to increase among colleges and universities. By 2013, more than 7 in 10 educators anticipate that they will offer more than 40 percent of their courses in a blended format in higher education (Kim & Bonk, 2004). Most blended learning courses are set up so that when the students are online they are reading assignments, and viewing websites and/or videos. When students return to the classroom setting with the instructor face-to-face, the instructor will check their understanding with oral or written questions. Offering blended learning allows students to be more flexible and take courses from the comfort of their home environment and it decreases the need to be in a classroom for face-face instruction on a daily basis. In the past, colleges have mostly used lecture style instruction that can accommodate large audiences, but this form of teaching style limits engagement for students. Blended learning both accommodates the masses of students and increases student engagement (Kenney & Newcombe, 2011). The increase of blended learning allows colleges and universities to offer a different form of teaching and learning by offering flexibility in their courses, changing and improving their pedagogy, increasing student engagement and help in delivering a cost-effective solution to the decreases in the educational budget (Graham, 2006). When reviewing research with blended learning and higher education- does it engage learners, improve student participation and provide other positive outcomes? In one research project involving pilot testing blended instruction for a large size class classroom at a medium university by Kenney and Newcombe (2011), they found that it did improve learning. On a unit test on human development "the blended section had a

slightly higher average score than both the large, non-blended section, and the small, non-blended section."(p. 52). Also, due to the research by Kenney and Newcombe (2011), students that participated in a blended learning environment felt more engaged, increased their participation levels, and utilized more course materials in order to help comprehend the course work.

However, do students involved with blended learning always learn better online compared to those students who actually go to a brick and mortar classroom with their instructor? In reading many research papers, for every paper that showed results favoring blended learning, one could find just as many studies showing that blended learning students had lower results in learning compared to their face-to-face counterparts. Rivera and Rice (2002) found that student performance in a traditional classroom (brick and mortar) compared to those students using blended learning remained unchanged as shown in Figure 2. Also, using technologies does not mean that students are using critical thinking skills and it doesn't incorporate how students learn (Oblinger & Oblinger, 2006). Many variables can affect whether or not students who are involved in blended learning will always outperform those that are involved with face- to- face instruction. Do certain generations of students perform better in blended learning compared to other generations? For example, does the Y generation perform better than the X generation since they were born in the technology era? Variables can include the rigor of the curriculum content; which curriculum components are best taught face-to-face or online, instructor utilization of classroom management system such as BlackBoard or Moodle; and provision of technical support to their classrooms. Additionally, if quizzes are completed in the brick and mortar of the classroom with paper and pencil, is there a considerable difference with those students that complete the quizzes online?

Course Section	Exam Score Average
Traditional Class	74.85
Hybrid Class	73.35
Web based Class	73.97

Figure 2. Adopted from "A comparison of student outcomes and satisfactions between traditional and web based offerings," by J. Rivera and M. Rice, (2002) Online Journal of Distance Learning Administration, 3, http://www.westga.edu/~distance/ojdla/fall53/rivera53.html 1-10

Blended Learning in the Workplace

Blended learning in the workplace evolved through the birth and popularity of the internet that evolved in the 1990's. Prior to using blended learning, companies would train their employees with a face-to face trainer or with the use of VHS tapes and DVD's. Instruction was first set up solely with the use of face-to-face training but with the use of computers it evolved to e-training. E-training comprises of all training taking place with the use of computers and the internet with no face-to-face instruction (Stein, Shepard, & Harris, 2011). Examples of e-learning in the workplace can involve employees either reading text and then taking an online quiz to check for comprehension, watching videos about the content they need to know, or watching computer simulations to learn about their job. Courses delivered online do not always meet all the different learning styles of employees. One way to broaden the scope of learning styles is to offer blended learning for the employees where they would receive face-to-face instruction with self-paced learning. According to Slotte and Herbert (2008), "socially situated blended learning design and delivery are effective ways to motivate personnel to use an e-learning program as part

of workplace learning" (p.166). For example, employees of an educational software company can view simulations of how the sales process to the school environment occurs or the best ways to provide customer service. Further instruction can take place with the instructor leading discussions and asking questions about customer service and the sales process in order to check for employees' understanding. This also allows the employees to be more engaged within their learning and allows for the instructor to facilitate employees best learning outcomes. Blended learning reinforces skills through simulations that the employees need, and further engages those skills though small group face-to-face discussions to prepare them for real-life situations (Slotte & Herbert). Another advantage to blended learning in the workplace is the flexibility it offers workers. A corporation might have employees across multiple states, so what better way to train them than to offer blended learning. These employees can get trained via web-based software and then meet face-to-face with an instructor once a month. It would be a cost savings for the company because they would not have to provide travel, meals and hotel costs for each employee to arrive at company headquarters on a weekly basis. Besides the cost of face-to-face training, and the inflexibilities of training at certain locations, companies also loose productivity from their workers due to the time they spend away from their actual work to go to a face-to-face training (Lee, Frenzelas, & Anders, 2008).

Major companies such as Microsoft, IBM, Sun Microsystems and FedEx use a blended learning approach to train their employees effectively. IBM is known for their four-tier model that uses online training, support, and collaboration and face-to-face learning labs to enhance the online portion. (Lee et al., 2008). Companies also use a form of blended learning by using EPSS (electronic performance support systems). Employees get their basic knowledge of their job and can access critical information later to solve a problem through EPSS. This type of support is

blended with their face-to-face training and gives employees access to a large amount of content (Reiser & Dempsey, 2012).

Another example of blended learning in the workforce is when companies, such as Pearson or Discovery Education Science, design the blended learning themselves and sell them to the educational entities. Discovery Education Science uses streaming video and online learning modules for students to use on their own or in collaboration with the class. The teacher can do face-to-face instruction with the streaming videos, use the videos as a concept starter or have discussions after the modules. Pearson, a leader in educational materials, created a virtual classroom for SIOP (Sheltered Instruction Observation Protocol) to instruct teachers in best practices in teaching to English Language Learners. Pearson can also follow-up the virtual classroom with live chats online and a live face-to-face instructor that comes to the school to reinforce the concepts taught in SIOP.

Blended learning in the workplace does have some concerns, which are similar to those that appear when using blended learning in higher education. One of the main concerns is learning outcomes. For example, how much training is needed in order for the employees to understand the content? (Slotte & Herbert). And, which types of instruction should be done online and which should be done face-to-face in order to achieve the best learning outcomes? In other words, what is the right blend of online and face-to-face instruction? How much knowledge can employees learn online to transfer to their offline job duties? According to Lee, it is suggested when providing blended learning in the workplace, keep the learning phases close in contextual connections so that the learners maintain a continuous learning experience and use a sound framework such as Merrill's *First Principles of Instruction* (Lee, 2010). Choosing a quality framework is important in order to check for learning transfer. An example of Merrill's

First Principles of Instruction applied in the work training environment includes: Activation and Demonstration can be online activities, Application and Integration can be offline activities, and Job Application is what the employee would transfer to an on-the-job situation (Lee). Once a good framework is in place, then it's easier to collect data to measure the transfer of learning. Another concern in the workplace is what skills are needed by the worker to have a successful learning experience using technology.

Costs associated with the technology hardware and software for blended learning is another concern for corporations. Companies look at their ROI (return on investment) for purchasing. Will the purchasing of resources such as instructional technologists, trainers, hardware and software, be a solid and positive ROI for the company? Will well trained employees outweigh the costs associated with blended learning and will the process and employees be productive for the company? These are the reasons that a Performance Improvement Specialist would need to be hired to measure human performance improvement with the use of human performance technology (Shaffer, 2000). Checking a company's performance while analyzing their blended learning will check for their outcomes.

Blended Learning with K-12 Education

Blended learning in K-12 education, when compared to higher education and corporations is early in the process. Most states have some use of blended learning, "but no state has a full suite of full-time and supplemental options for students at all grade levels" (Watson, Murin, Vashaw, Gemin, & Rapp, 2011, p. 4). Unlike corporations and higher institutions, K-12 education does not usually incorporate blended education beyond the proximity of their brick and mortar building. The reason being is K-12 schools are still set up in proximity by zip code and the students attend the closest school building to their zip code for face-to-face instruction

(Watson et al., 2011). Of course the exception to this above concept is the few schools in K-12 education that are virtually 100% online.

Currently, the most popular form of blended learning in the K-12 environment is the use of the flipped classroom. The homework is done in the classroom and the instruction is done at home. The flipped classroom has students do online work, watch video podcasts at home, and post a list of questions and / or concerns for the teacher online. The teacher can then review all the questions before class so concepts that are already mastered by the students are not reiterated again rather the teacher's concentration takes place on the concerns and unknowns of the student. The teacher merely guides the students to collaboration and discussion. This method sounds high in student engagement, however one would have to look at the content involved such as are the videos that the students watch at home engaging or merely a "talking head" or lecture. Formative assessments can be used to check for progress. The flipped classroom is definitely student centered learning. Since the flipped classroom is the current rage right now in K-12 education, it's apparent that current research isn't complete enough on the learning outcomes of the students.

The known Khan Academy is used in some K-12 schools for blended learning. Students watch videos, for example, in mathematics or science in a computer lab independently, or at home. The teacher guides their learning in a collaborative group setting to review concepts so the students have a complete comprehensive understanding of the video. Some teachers have found that students have not increased their learning outcomes using blended learning, even though labs were used in the classroom (Ash, 2012).

High Schools use blended learning for students that are in danger of not passing certain subjects such as Algebra, U.S. History, Biology; end of course exams, or at risk of not being

promoted to the next grade level or graduating. Students can take credit recovery if they do not pass the class the first time and they are a sophomore, junior, or senior, and they need the class to graduate. Credit recovery is a program that allows the students to take certain subjects, aligned with the curriculum and state standards, online. Many vendors such as PLATO, Pearson, and Apex Learning offer school districts this software. The students go through the coursework online during or after school in a computer lab setting with the teachers assisting the curriculum. Many school districts claim that the Credit Recovery program in a blended setting has helped their school districts increase their graduation rates and increased student learning. However, when looking at high school graduation data, for example from the Indiana Department of Education, some districts have decreasing graduation rates between years as seen from the chart in *Figure 3* (Indiana Department of Education, 2012). Plus, enough research does not presently exist to study the students who have taken credit recovery for certain courses; such as how does one know how many times did the student take the course before passing. How much has motivation played in the minds of students who take credit recovery courses when faced with the possibility of not graduating from high school is also an important questions for additional research to answer.

Schools with Credit Recovery	School Year 2009 Graduation Rates	School Year 2010 Graduation Rates	School Year 2011 Graduation Rates
High School A	89.8	93.6	93.7
High School B	55.7	52.0	67.0
High School C	91.3	85.1	92.1

Figure 3: Adapted from "Graduation Cohort Rate," by Indiana Department of Education, 2012,
http://www.doe.in.gov/improvement/accountability/graduation-cohort-rate

Another way that high schools use blended learning within their schools is when Dual Credit is being offered through the means of a college and/or university. Some states have a requirement that each high school has to offer two dual credit courses to students. Students are able to take the required coursework for graduation and at the same time earn college credit for that course. The college credit course can be taught by a high school teacher or an adjunct professor. Upon completion with a passing grade, that student would receive college credit to be applied towards college upon high school graduation. The teacher assists the student within the classroom and the student takes portions of the course online. According to Pyzdrowski, Butler, Walker, Pyzdrowski, and Mays, who studied students that took a blended Algebra course, found those students outperformed their on-campus students; however, when it came to participation and final cumulative final exams, no significant difference existed between the two groups (2011).

One of the major disadvantages of blended learning in K-12 education is the development process; it takes about two years and incurs additional costs such as the technology, instruction, and support from students, teachers, administrator, and instructional content (Watson et al., 2011). Another major disadvantage is not all students will have access to computers or the internet in order to complete blended learning at home such as in the scenario of a flipped classroom. Lack of access to the internet could be countered if the instructor burns the content of the course onto a CD-ROM, but that would increase instructor preparatory time for the lesson, and does not help those students without computers. And, the instructor would have to be informed in regards to copyright issues when burning content onto a CD-ROM.

Challenges for Learners and Instructors

When individual learners are involved with a blended learning model for a course in work or education, the learners have to be more independent and motivated and have good time-management skills for the online portion compared to being in a face-to-face classroom (Napier and Lee, 2011 and Tabor, 2007). It takes a great deal of self-structure to set a time aside to read the course instructions, materials, and postings for discussions for an online class. In addition, learners need to respond to discussions posted by fellow classmates which are intermittent yet must be done in a timely manner. Motivation has to be intrinsic, if the student is to succeed in the online portion more so than the offline portion. If a student does not understand the assignment instructions, then that student has to email or post a question to the instructor, which can cost the student time compared to having the question answered with the instructor present in the classroom. Students also need more feedback from the instructor in an online environment (Tabor, 2007).

Teaching methods will be challenging and changed to incorporate blending learning for the instructor. Using the right hardware and software, and knowing how to incorporate and use these tools in an effective manner, takes time. Support for the instructor needs to exist in terms of staff and technicians. Blended learning would be an easy transition if the online portion just involved taking the instructor's everyday content and putting it online. However, instructors need to redesign the content to deliver it online and use different pedagogical strategies (Vaughan, 2007).

In order to integrate a sound blended learning model, one should plan on spending two to three times longer on the model than what it would take for face-to-face instruction assuming that the technology is working properly and the content is complete (Johnson, 2002). A common

theme uncovered by Benson, Anderson, and Ooms is the best technology is not a replacement for inadequate teaching (2011).

Conclusion

Advantages exist for blended learning in the educational and business arena. Higher education uses blended learning to offer courses to masses of students. Corporations use blended learning to utilize training methods and to save money on the delivery. K-12 education is starting to get more involved in blended learning in using the flipped classroom techniques. The main advantages that exist in every environment are the flexibility and engagement for the learners. However, research does exist that shows no difference on learning concepts so more studies need to be done in this area. Blended learning also offers a reinforcement of skills. Disadvantages exist through including the costs of the hardware and software implementation and preparation.

Discussions and Future Research

When conducting research on blended learning, more studies have to involve more constants or controls in the designed research. For example, a well-designed research plan should use the same characteristics of students, utilize the same instructor and the same curriculum for classes, and use the same formative and summative tests. Many sample results with the criteria mentioned have to be produced in order to obtain more valid and reliable results. Also, studies have to be done and compared in these formats: face-to-face instruction solely, face-to-face with online instruction (blended learning), complete online instruction, and online instruction with live instructor led sessions.

More research on blended learning in the K-12 area needs to take place. Out of all the environments: corporations, higher education, and K-12 education, the latter has just begun to

get more involved in blended learning with concepts such as the flipped classroom. Blended learning that is taking place in K-12 education exists mostly at the high school level in taking courses that offer dual credit at higher education institutions.

Research needs to be done on what is the right balance of instructional design to produce the best learning outcomes in a blended learning environment and the effect is has different learning styles. Also, research has to be done on blended learning frameworks so instructors have more information on what is best framework to use for the learner.

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