# Online education: benefits, positive and null findings

Education, Learning

## Introduction

The physical “ brick and mortar” classroom is starting to lose its monopoly as the place of learning. The Internet and the World Wide Web have made significant changes to almost all aspects of our lives ranging from a global economy, personal, and professional networks to sources of information, news, and learning. In today’s fast moving world of technology many people find themselves trapped with no time to do all the things they want to. That is the reason why all services offered through the Web are constantly gaining more popularity. The Internet has made online learning possible, and many researchers and educators are interested in online learning to enhance and improve student learning outcomes while combating the reduction in resources, particularly in higher education (Farinella, Hobbs, & Weeks, 2000; Kim & Bonk, 2006; Pape, 2010). Moreover, there have also been increases in demand for online learning from students from all walks of life. Given the exponential — some would say precipitous — growth of online education and its potential in higher education, it is imperative that researchers and educators examine the effectiveness of online learning in educating students compared to traditional face-to-face learning. Many students prefer to take different courses online, communicate with friends online and as a result spend most of their time in front of the computer exploring the vast world online and everything it offers.

## Definitions

Online learning is a form of distance learning or distance education, which has long been a part of the American education system, and it has become

the largest sector of distance learning in recent years (Bartley & Golek, 2004; Evans & Haase, 2001). For the purpose of this literature review, both hybrid or blended learning and purely online learning are considered to be online learning as much of the literature compares these two formats against the traditional face-to-face. Purely online courses are courses delivered entirely over the Internet, and hybrid or blended learning combines traditional face-to-face classes, learning over the Internet, and learning supported by other technologies (Bliuc, Goodyear, & Ellis, 2007; Hoic-Bozic, Mornar, & Boticki, 2009; Osguthorpe & Graham, 2003).

## The Benefits and Uses of Online Learning

One reason why there is so much discussion around online learning is that there are many purported benefits and uses of online learning. Some of the most important ones are: its effectiveness in educating students, its use as professional development, its cost-effectiveness to combat the rising cost of postsecondary education, credit equivalency at the postsecondary level, and the possibility of providing a world class education to anyone with a broadband connection (Bartley & Golek, 2004; De la Varre, Keane, & Irvin, 2011; Gratton-Lavoie & Stanley, 2009; Koller & Ng, 2014; Lorenzetti, 2013). What has received most of the attention for online learning is the postsecondary education arena. The rising cost of postsecondary education and the importance of a postsecondary degree are well documented in the literature. The lifetime earning gap between high school graduates and college graduates is continuing to widen (Dynarski & Scott-Clayton, 2013). At the same time, the cost of college tuition is rising faster than inflation and the student loan debt is rapidly increasing. As of 2014, the total national

student loan debt is over one trillion dollars (Finaid. org, 2014). Many scholars and educators believe that online learning can be an effective tool in combating the rising cost of postsecondary education by spreading the cost of a class over a much larger number of students compared to the traditional setting, dividing the cost by tens or hundreds of thousands of students as opposed to dozens (Bowen, 2013; Bartley & Golek, 2004; Jung & Rha, 2000; Koller & Ng, 2014; Tucker, 2007). Moreover, the marginal cost of a student in an online setting is negligible relative to the traditional setting, necessarily constrained by a number of factors such as the size and availability of the physical classroom.

Intimately connected to this issue of cost and postsecondary education are the required credits to obtain a postsecondary degree. Traditionally, students have to earn most of the college credits at an institution before they are awarded bachelor degrees at that institution. The point of contention is how online classes will play a role in awarding credits or credentials, and many educators connected to online learning are hoping that there will be credit equivalency for some online classes. For instance, Daphne Koller and Andrew Ng, creators of Coursera, had worked with the American Council on Education to recommend credit-equivalency for some online courses (Koller & Ng, 2012). The goals of this endeavor are to increase completion rate, reduce time to degree attainment, reduce costs to postsecondary education, and offer more access to non-traditional students. As of 2013, the American Council of Education had approved five online courses for college credit (Kolowich, 2013). However, there is concern over whether colleges will accept the recommendation, and there is also concern

about the dilution of a traditional degree due to the transition (Kolowich, 2013; Lorenzetti, 2013).

Last but not least, there is the hope that online learning will be able to provide a world class education to anyone, anywhere, and anytime as long as they have access to the Internet. A number of websites and companies — Khan Academy, Udacity, edX, and Coursera are some of the most prominent ones — are built on this premise, and many well-respected scholars and entrepreneurs have high hopes and expectations for online learning, particularly for massive open online courses (Bowen, 2013; Fisher, 2012; Koller & Ng, 2012; Lewin, 2012; Selingo, 2013). Central to this particular benefit — in fact, to most of the purported benefits of online learning — is the effectiveness of the online format in educating students. If online learning is generally less effective than the conventional face-to-face format, then some of the aforementioned purported claims and benefits of online learning are highly suspect. Therein lies the crux of the issue, the fundamental concern of online learning and the focus of this paper: the effectiveness of the online format in educating students compared to the traditional format. To address this issue, the positive, negative, and mixed and null findings of the effectiveness of online learning as compared to the traditional format will be examined.

## The Positive Findings

There are a large number of studies that find positive statistically significant effects for student learning outcomes in the online or hybrid format compared to the traditional face-to-face format. Some of the positive

learning outcomes are improved learning as measured by test scores, student engagement with the class material, improved perception of learning and of the online format, stronger sense of community among students, and reduction in withdrawal or failure. Consider the following illustration based on a study by Riffell and Sibley (2005). Jean-Luc was an archeologist who needed to fulfill a general science course to graduate. He had not performed well in a traditional science course and when he saw there was a hybrid environmental biology course that included bi-weekly online assignments in lieu of the traditional lecture, he thought this might work better for him. He found that the online assignments gave him time to think and reflect about the materials better than the traditional lectures. This led him to understand the ideas more thoroughly, which allowed him to participate more during face-to-face active-learning exercises. He also felt that he had more meaningful online and in-person interactions with the professor since he was able to participate more than he usually did in a science class. As a result, Jean-Luc had a deeper understanding of environmental biology and he did well in the class, above the average performance of his face-to-face counterpart and well above what he expected from himself. This simple example illustrates the kind of stories that can be told in these positive studies.

From a more systematic analysis, Navarro and Shoemaker (2000) found that student learning outcomes for online learners were as good as or better than traditional learners regardless of background characteristics and that the students were greatly satisfied with online learning. Rovai and Jordan (2004) examined the relationship of sense of community between traditional

classroom and the blended format, and they found that students in the blended format had a stronger sense of community than students in the traditional format. In a study that compares learning outcomes for students who self-selected into the online format for a macroeconomics course, researchers found that after correcting for sample selection bias, test scores for the online format students were four points higher than for the traditional format (Harmon & Lambrinos, 2006). In a methodologically rigorous study conducted at Ithaka (Bowen & Ithaka, 2012), students were randomly assigned to the traditional format (control) and a hybrid interactive online learning format that met once a week where students did most of the work online (treatment). The researchers found that there are comparable learning outcomes for both groups and that there was the promise of cost savings and productivity gains over time for the hybrid course. Furthermore, these learning improvement and cost saving gains are expected to increase as new tools and software for online learning are being developed and tested continually.

In a large political science course, using mixed methods, researchers found that students using PeerWise — a recently created online pedagogical tool that enables students to write, share, answer, discuss and rate multiple choice questions with little to no input from the instructor — had better learning outcomes and improved perceptions of learning as well as motivation to learn (Feeley & Parris, 2012). To further develop the use and effectiveness of PeerWise, a study on the effect of virtual achievements, a badge-based achievement system in PeerWise, in a large randomized control trial found that there was a significant positive effect on the quantity of

students’ contributions without a corresponding loss of quality (Denny, 2013). As online learning grows, more and more aspects of “ gamification,” the use of game mechanics and virtual achievements in non-game contexts to engage users, are being added to the virtual environment to increase task engagement and decrease attrition (Deterding, Dixon, Khaled, & Nacke, 2011; Huotari & Hamari, 2012; Kapp, 2012).

Even though there are positive findings for the effectiveness of online learning, it is still unclear that this generally holds true across studies. Funded by the U. S. Department of Education, a team of researchers at Stanford Research Institute International conducted a systematic search of the literature from 1996 to 2008 and identified more than a thousand empirical studies of online learning (Means et al., 2010). In the meta-analysis which used stringent criteria for selecting studies that utilized a rigorous research design, compared online learning with the traditional format, quantitatively measured student learning outcomes, and provided enough information to calculate an effect size, the researchers analyzed 45 studies and on average, they found that students in an online format performed modestly better than those in the traditional format. The difference in student learning outcomes was larger in the studies where online elements were blended with face-to-face instruction, and these blended conditions often included additional learning time and instructional elements not received by students in the control conditions. The variations in how online learning was implemented did not affect student learning outcomes significantly, but it should be noted that there is a small number of studies for this particular finding (N= 13). The researchers concluded that the

combination of time spent, curriculum, and pedagogy in the online format produced the observed difference in learning outcomes, but there was no evidence that online learning is superior as a medium for learning, which is consistent with prior literature (Bernard et al., 2004; Clark, 1994). The researchers noted that there were few rigorous K-12 studies and so their findings are not necessarily generalizable to K-12 settings.

It must be emphasized that this seminal work by Means et al. is one of the most cited and well-respected meta-analyses to date (Lack, 2013). It sets a very high standard for meta-analytical work, and its main finding is student learning outcomes are better for online learning than the traditional format, modest, but significant nonetheless.

## The Null Findings

In comparison to the number of positive studies, there are many, many more studies that found null findings for the effects of online learning. One of the most cited (1900 citations!) and well-known studies for the effects of distance and online education on student learning outcomes is the seminal work by Thomas Russell (1999). The author compiled over 350 studies on distance and online education dating back from 1928 that suggested that there is no significant difference in the learning outcomes for the traditional face-to-face format versus mediated instruction. Of all the positive, mixed, null, and negative findings on the site, about 70 percent of the studies found no significant differences. However, one of the most common criticisms of Russell's work is that the majority of the original studies have poor methodology: they often lack control groups, random assignment,

experimental controls for confounding variables, and little to no discussion of attrition. Subsequent meta-analyses, such as Bernard et al. (2004) and Means et al. (2010), have used more rigorous selection criteria.

In a meta-analysis in higher education, Bernard et al. (2004) found that overall there was no significant difference in achievement, attitude, and retention outcomes between distance education, which included online education, and the traditional face-to-face education. However, there was significant heterogeneity in student learning outcomes for different activities. Separating student learning outcomes based on synchronous and asynchronous activities, activities that have to be done at the same time or at each person’s convenience respectively, showed that the mean achievement effect sizes for synchronous work were better for the traditional format, but asynchronous work favored distance education. In other words, there are better learning outcomes in the traditional format for activities that have to be done simultaneously and better outcomes in the mediated distance format for activities that can be done at various times. Moreover, researchers also found, using weighted multiple regression, that the methodology of the studies accounts for most of the variations in learning outcomes followed by pedagogy and media (Bernard et al., 2004). Otherwise stated, the medium of distance education, whether it is mail correspondence or the TV or the Internet, explains the least of the variation in learning outcomes, which supports Clark’s (1994) claim and is later confirmed by Means et al. (2010). Other studies have also arrived at similar conclusions. For instance, a recent systematic review comparing the learning of clinical skills in undergraduate nurse education between the online format and the

traditional found that there was no significant difference between the two formats (McCutcheon, Lohan, Traynor, & Martin, 2015).

In 2005, a year after Bernard et al. published their study, another group published an analysis on the effectiveness of distance education. Zhao et al. (2005) analyzed prior literature, which included the Russell's 1999 study among other meta-analyses, and found that the overall mean effect size was close to zero, but there was a modest size standard deviation. They then used a rigorous methodology to trim studies with weak methodology or ones that did not provide adequate information and arrived at some rather interesting findings. Zhao et al. found the presence of the Hawthorne effect where there was a tendency to find favorable findings for distance or online education if the researcher was also the instructor of the course. They also found that the " right" mixture of human and technology, i. e., hybrid or blended learning, was particularly effective. Implications of this study are that courses that can combine the strengths of online learning and traditional learning are more effective than courses that use mainly one format and it is possible that as digital and online technologies improve and mature they will become more effective in helping students learn.

It would be too easy altogether to jump on the online learning bandwagon or to dismiss it as a fad that will go away (and come back as many educational fads have been known to do). Overall, there is strong evidence to suggest that online learning is at least as effective as the traditional format, but the evidence is, by no means, conclusive. Online learning is a story that is still being written, and how it progresses will likely depend on those present.

## Conclusion

As already mentioned, online educations are a great choice for people who want to continue with their studies while being occupied with working or taking care of a household. In that way, people are not limited geographically. Courses can be attended by participants living and working everywhere in the world. That new type of education will give a chance to many who are not able to attend traditional educational courses and to obtain a degree. By understanding the advantages and the disadvantages of online education, you will have a better understanding on how these factors will affect you if you choose to pursue your degree online