The Effectiveness of Online Learning:
Beyond No Significant Difference and Future Horizons

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Abstract

The physical "brick and mortar" classroom is starting to lose its monopoly as the place of learning. 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. It is imperative that researchers and educators consider the effectiveness of online learning compared to traditional face-to-face format and the factors that influence the effectiveness of online courses. This study examines the evidence of the effectiveness of online learning by organizing and summarizing the findings and challenges of online learning into positive, negative, mixed, and null findings. Particular attention is paid to the meta-analyses on the effectiveness of online learning, the heterogenous outcomes of student learning and the endogenous issue of learning environment choice. Taken as a whole, there is robust evidence to suggest online learning is generally at least as effective as the traditional format. Moreover, this body of literature suggests that researchers should move beyond the "no significant difference" phenomenon and consider the next stage of online learning.

Key words: no significant difference, online learning, hybrid learning, blended learning, higher education, selection bias

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. 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. Thus, this paper addresses the question of "To what extent does the body of work on online learning indicate that online learning is as least as effective in educating students as the traditional format?"

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. The author has continued this work by soliciting and compiling studies on distance education in its various formats—most of the current studies are now on online learning—at http://www.nosignificantdifference.org. This website contains one of the largest collections of studies comparing the effects of distance and online learning versus the traditional format. 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.

One unexpected finding from the Zhao et al. study was that the publication year was a significant moderator for the effectiveness of distance education. Studies published before 1998 do not find significant difference between distance education and traditional education while studies published in and

after 1998 generally find significant differences in favor of distance education. It is perhaps useful to think of online classes before the turn of the millennium as first-generation online courses and those after as second-generation online courses. The second-generation online courses are able to build upon the first-generation courses and improved student learning. It remains to be seen if massive open online courses (MOOCs), due to the sheer numbers of users and open access feature, are substantially different enough to be classified as third-generation or if it is simply a continuation of the second-generation. Most of the current conversations and studies in the literature, including this paper, are focused on the second generation of online courses.

In summary, most of the no significant difference studies found that *overall* there are no significant differences. However, other studies find the effectiveness of online learning is not positive or equivalent compared to the traditional format and some find that certain groups of students benefit from online learning while others benefit from the traditional format. To get a more complete picture, there needs to be an examination of the mixed and negative findings to arrive at a more nuanced conclusion.

The Mixed and Negative Findings

Compared to the number of studies that found positive or no significant effects for student learning outcomes in the online format, the number of studies that found mixed or negative significant effects is much smaller, by a full order of magnitude. Some of these studies are direct contradictions of the studies with positive results: they find that students performed worse in the online format compared to the traditional format. Some studies' findings are more nuanced. They find that there are negative effects for certain groups of students and null findings for others. There are studies discussed in this section that systematically examine the ubiquitous self-selection bias of online learning: the endogeneity of learning environment choice. Most studies on distance or online learning do not examine this selection bias, which some researchers posit as a culprit for the "no significant difference" phenomenon.

In a study that compares student learning outcomes in a microeconomics course, Brown and Liedholm (2002) found that students in the online format performed significantly worse on tests than the students in the traditional format even though they had better GPA and ACT scores. This difference was most pronounced for complex questions and least pronounced for basic questions. One possible explanation was that half of the online students reported to spend less than three hours per week and none claimed to spend more than seven hours per week, while half of the students in the traditional format attended every class, a minimum of three hours per week. The differences in time devoted to class or active engagement resulting in differential outcomes were also found in another study (Hiltz et al., 2000). Brown and Liedholm (2002) also found that female students performed significantly worse, six percentage points worse, than male students in the traditional format, but there was no significant difference for the sexes in the online format. Other studies have also found that sex is a moderating variable for student learning outcomes when comparing online and traditional formats (Figlio, Rush, & Yin, 2010; Xu & Jaggars, 2013). For instance, Xu and Jaggars (2013) used a dataset of about 500,000 courses taken by over 40,000 students in Washington state, and they found that there were detrimental effects for all types of students in the online format, but most particularly for male students, younger students, black students, and lower-achieving students.

In one of the first experimental studies on the effects of traditional instruction versus online learning where students were randomly assigned to live lectures versus watching the same lectures online while supplemental materials and instructions were the same, Figlio et al. (2010) found modest evidence that the traditional format has a positive effect compared to the online format. This difference was more pronounced for Hispanic students, male students, and lower-achieving students. One possible and very likely significant internal validity threat, which the authors fully acknowledge, was treatment diffusion for the "live-only" students since they could look at the online lectures using a friend's account, while "online" students were prevented from attending live lectures. Moreover, there were at least two sources of external validity threats: volunteer effect and grade incentive (half a grade boost to students who volunteered to be in the experiment). Thus, researchers should be cautious in interpreting this study's findings or generalizing them to other settings.

Perhaps the most mixed finding of all the research thus far is the most recent meta-analysis by Kelly Lack at Ithaka S&R (2013). Using a similar set of criteria as the DOE meta-analysis by Means et al. with an additional criterion for the studies to involve one or more undergraduate for-credit college course(s), Lack

found an additional 30 studies that were published after the DOE report and/or simply missed. The researcher found that most of the studies had mixed results. In some studies, students in the online or hybrid format performed better, but in others, they performed worse, and for some, there were no significant differences between the two groups. She concluded that these studies did not provide enough evidence for assessing whether online learning is significantly more or less effective than the traditional face-to-face format.

In short, there is not a constant effect for the effectiveness of online learning relative to traditional learning. There is strong evidence for the heterogeneous outcomes of the effects of online learning, and in particular, a number of student characteristics such as sex, race/ethnicity, and ability, can moderate the learning outcomes. Moreover, there are other factors such as the existence and structure of learning communities, the type of online learning activities, varied materials, formative assessment, and the level of students' active engagement also play critical roles in determining the outcomes of the two formats (Blitz, 2013; Brown & Liedholm, 2004; Hiltz et al., 2000; Tsai, Tsai, & Lin, 2015; Wang et al., 2006). For instance, Brown and Liedholm (2004) found that there was considerable diversity in both the order in which students used course materials (ranging from textbook, media-enhanced PowerPoint slides, video lectures, interactive and individualized Excel-based practice problems, and repeatable, low-stakes practice questions) and the value they placed on different materials for learning. They concluded that additional tools and variegated materials in a course would be more beneficial than the exclusion of them.

Lastly, there is the ubiquitous threat of selection bias: the endogeneity of learning environment choice. If students self-select into the online format, then the achievement differences between the online and traditional format are potentially biased as a result of the characteristics of the students. Therefore, this particular issue must be examined thoroughly.

Selection Bias

In terms of selection bias, one of the first studies that address this issue is a study by Anstine and Skidmore (2005). The researchers examined the effectiveness of online learning versus traditional learning for MBA students at a comprehensive university. The courses were taught by two instructors who developed the course for the online environment first and then each instructor taught both formats. A comparison of test scores indicated no differences in learning outcomes for the traditional and online format. However, students were not randomly selected into control or treatment group. Instead, students selected their learning environment. The concern was that students with higher human capital endowment self-selected into the online format, resulting in an increased in the mean test score. Anstine and Skidmore found that when other factors other than online format and tradition format were controlled, the outcomes in the online format were inferior to the traditional format. They compared the results of a two-stage least squares analysis against ordinary least squares and found similar results, and a switching regression showed that the online format was substantially less effective than the traditional format. They concluded that self-selection bias masked the true effectiveness of the traditional format relative to the online format, and once corrected, the learning outcomes for the online format were inferior.

This point is well taken as the majority of studies and meta-analyses do not account for the endogenous selection bias, so it is unclear and unknown how many "no significant difference" studies would come to a different conclusion once selection bias is accounted for. However, it must also be acknowledged that there is a small sample size in Anstine and Skidmore's work.

Nevertheless, there have been other studies that have found similar results as Anstine and Skidmore (Brown & Liedholm, 2002; Coates et al., 2004; Gratton-Lavoie & Stanley, 2009). For instance, in a study comparing student learning outcomes between online and traditional formats in a Principle of Economics undergraduate course, Coates et al. (2004) found that the achievement differences bias toward zero if self-selection was not taken into account. In the selection-corrected model, the students in the online format scored significantly worse than the students in the live format. An endogenous switching model predicted that had online students selected the live format instead of the online format, ceteris paribus, they would have performed better.

The story, however, does not end there. It should be noted that the many of the studies that find student learning outcomes in the online format are inferior to the traditional format are done at the undergraduate level in Principle of Economic courses (Brown & Liedholm, 2002; Coates et al., 2004; Figlo, Rush, & Yin,

2010; Gratton-Lavoie & Stanley, 2009). Harmon and Lambrinos hypothesized that the outcomes might be different for graduate students who might be more mature and have better independent learning skills (2012). Using panel data and fixed effects model to correct for bias from unobservable variables, the researchers found that the effect of online learning was not significantly different than the traditional format for graduate-level students and may have a positive effect on learning outcomes (a 23% increase in correctly answering a question at the .10 level). The researchers believed this finding suggested that more mature students with better independent learning skills were better candidates for online learning.

Summary of Findings

Using the studies found on Nosignificantdifference.org as indicator of the effectiveness of distance and online learning, it would be observed that about 92% of all distance and online education studies find that distance and online education is at least as effective, if not better, than traditional education. About 3% of the studies compiled by the site show the reverse, that traditional face-to-face format is more effective, and about 4% show mixed findings. However, given the issues of selection bias that later studies pointed out and the lack of rigorous methodology of the earlier studies, it is difficult to say how meaningful these numbers really are. Moreover, this repository is subject to selection issues related to voluntary submittal to the site. In terms of high standard meta-analyses, Means et al. (2010) found there is positive but modest significant difference in favor of online learning, and Lack (2013) concluded that there is not enough evidence one way or another. Given these findings, there are two different but intertwining paths that researchers and educators can take at this juncture.

Beyond No Significant Difference and Future Horizons

The first path is the ever ubiquitous "more research needed" approach to determine the heterogeneity effects of online learning. Researchers and educators should conduct more research on the effectiveness of the online learning format, employing rigorous research designs and report adequate information to contribute to the literature. In particular, there needs to be a focus on the factors that have been observed to have an impact on the effectiveness of online education: self-selection bias, blended instruction, active engagement with the materials, formative assessment, varied materials and repeatable low-stake practice, collaborative learning communities, student maturity, independent learning skills, synchronous and asynchronous work, and student characteristics. Moreover, there is pressing need for more research in the learning sciences in regards to how students learn online and how adaptive learning software can mediate and individualize student learning.

An interesting research question in this area would be: To what extent do blended instruction, active engagement with class materials, formative assessment, varied materials, low-stake practice, collaborative learning communities, and synchronous and asynchronous work influence student learning outcomes? These factors are (presumably) under the direct control of the course instructor and can be adjusted to improve student learning. One challenging aspect of this work would be how to measure each of those factors, as they are not all simply descriptive and easily quantifiable. A possibility is using a panel of experts who have little to no direct link with the courses to rank each variable for each course independently and use a combined score as an indirect measure for each variable. This is simply a skeletal design of the research and needs to be fully fleshed out, but it could provide invaluable insight into what makes an online course effective.

The second path is to move beyond the no significant difference phenomenon. Twigg and Learning (2001) posited that the key to move beyond no significant difference was to individualize student learning and determine the most efficient and effective learning pathways for different learners in particular courses. Since then, there has been the development and growth of many software and courses that can and have been used to individualize student learning (Bowen & Ithaka, 2012; Feeley & Parris, 2012; Hoic-Bozic, Mornar, & Boticki, 2009; Mihai, Stanciu, & Aleca, 2011). For instance, in an experimental study of 228 university students, Xu et al. (2014) found that personalized virtual online learning environments improved students' exam performance, satisfaction and self-efficacy compared to non-personalized virtual learning environments. Moreover, in conjunction with learning sciences, scholars and researchers should use the massive amount of data collected from MOOCs and analyze student learning, click by click, as they go through lessons and quizzes. This should greatly increase what is known about how students learn and it should be used by researchers, educators, and entrepreneurs to design better online courses aimed squarely at improving student learning outcomes.

For individual instructors, there are a considerable number of available resources that can support the transition from the traditional format to online learning. The *Handbooks of Research on Educational Communications and Technology* cover considerable ground on online education, ranging from the theoretical foundations, different types of technologies, instructional design approaches, instructional strategies, and learning models (Jonassen & Driscoll, 2004; Spector et al., 2008). There are also practical resources that offer and provide innovative ideas to promote active learning online with ready-made adaptable activities, specific examples of what can be done, case studies detailing actual teaching practices, tips for effective pedagogy and technologies that are based on traditional theories integrated with the latest research in cognitive learning (Bennett, Marsh & Killen, 2007; Boettcher & Conrad, 2010; Thomas, 2011).

A most intriguing project that combines the work from both prospective paths would be the creation of one or two online courses that leverage the factors that are most effective in improving learning outcomes, individualize student learning using adaptive learning software, and incorporate non-trivial best practices of "gamification." Gamification has been found to increase engagement, motivation and productivity in solving problems and task engagement in a variety of non-game contexts including learning (Deterding et al., 2011; Hamari, Koivisto, Sarsa, & Hamari, 2014; Kapp, 2012; Landers & Callen, 2011; Tsai, Tsai, & Lin, 2015). The creators of the course should consist of experts on "gamification", online learning and learning sciences, and instructors of the most highly rated online courses. The goal would be to create an online course that maximizes student learning.

Concluding Remarks

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.

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