# Examining Online Research in Higher Education

## What Can We Replicate in K-12

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MICHIGAN VIRTUAL LEARNING®
RESEARCH INSTITUTE

## About Michigan Virtual Learning Research Institute

In 2012, the Governor and Michigan Legislature passed legislation requiring *Michigan Virtual™*, formally *Michigan Virtual University®*, to establish a research center for online learning and innovation. Known as *Michigan Virtual Learning Research Institute®* (*MVLRI®*), this center is a natural extension of the work of *Michigan Virtual*. Established in 1998, *Michigan Virtual's* mission is to advance K-12 digital learning and teaching through research, practice, and partnerships. Toward that end, the core strategies of *MVLRI* are:

- Research—Expand the K-12 online and blended learning knowledge base through high quality, high impact research;
- Policy—Inform local, state, and national public education policy strategies that reinforce and support online and blended learning opportunities for the K-12 community;
- Innovation— Experiment with new technologies and online learning models to foster expanded learning opportunities for K-12 students; and
- Networks — Develop human and web-based applications and infrastructures for sharing information and implementing K-12 online and blended learning best practices.

*Michigan Virtual* dedicates a small number of staff members to *MVLRI* projects as well as augments its capacity through a fellows program drawing from state and national experts in K-12 online learning from K-12 schooling, higher education, and private industry. These experts work alongside *Michigan Virtual* staff to provide research, evaluation, and development expertise and support.

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## Introduction

In what was the first systematic examination of the literature focused specifically on K-12 distance education, Rice (2006) wrote that, "a paucity of research exists when examining high school students enrolled in virtual schools, and the research base is smaller still when the population of students is further narrowed to the elementary grades" (p. 430). A full decade later, this theme is still a relatively accurate description of the field of K-12 distance, online, and blended learning. While there has been a significant increase in the amount of literature and research related to K-12 distance, online, and blended learning, practice continues to outpace the availability of useful research. One of the reasons for this state of affairs, as highlighted in the next section, is that too few researchers have focused their efforts to change the question from "Does online learning work?" to "Under what conditions does online learning work?" (Ferdig, 2010).

The goal of this report is to briefly examine the state of research in K-12 distance, online, and blended learning. I will begin by briefly outlining some of the themes in the research based on reviews of the literature that have been conducted, as well as explaining some of the limitations of this research. Next, I will also describe a series of studies that have been conducted within the higher education context that may be of particular interest to researchers and practitioners in the K-12 distance, online, and blended environments. Finally, I will discuss themes from these higher education studies within the context of future K-12 distance, online, and blended learning research.

## Literature Review

One of the best ways for practitioners and scholars to understand what is already known in a field is to undertake a review of the existing literature. According to Fink (2014), "a research literature review is a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners" (p. 3). To date, four literature review articles have been published related to K-12 distance, online, and blended learning (Barbour & Reeves, 2009; Cavanaugh, Barbour, & Clark, 2009; Hasler Waters, Barbour, & Menchaca, 2014; Rice, 2006).

The dominant theme in these four literature reviews is an examination of studies that have compared how students in K-12 distance and online environments performed with their counterparts in traditional brick-and-mortar environments. As Rice (2006) suggested, similar to "the research in adult distance education, the starting point for most studies in K-12 distance education is an analysis of student achievement relative to traditional face-to-face instruction" (p. 431). The remaining research that these literature reviews examined can be classified into two categories: 1) aspects related to teaching and learning online, and 2) online learning policy. Barbour and Reeves (2009) focused their discussion of teaching and learning online to issues of online student readiness characteristics and online instructional strategies and local support required to ensure student retention. Additionally, Cavanaugh et al. (2009) indicated that "in recent years (i.e., post-2000), the growing body of literature shifted to a refined description of practice and outcomes in virtual schools" (p. 12). While a much smaller body of literature (in comparison to the literature related to student performance), the more recent literature in the field has tended to focus more around issues related to the design, delivery, and support of K-12 distance, online, and blended learning. Finally, there has also been a small, but growing, body of literature focused on K-12 distance, online, and blended learning policy. This focus has come amidst concerns about the "(a) lack of

oversight/accountability, (b) improper use of public funds, (c) failing grades, and (d) dropout rates that are higher than their traditional school counterparts" (Hasler Waters et al., 2014, p. 383). Essentially, the growth in the practice of many forms of K-12 distance, online, and blended learning has surpassed the availability of research to guide its effective design, delivery, and support. The absence of research focused on K-12 distance, online, and blended learning has led some scholars to look for guidance in the research conducted in higher education and other adult contexts.

## Methodology

In order to select appropriate, impactful research focused in higher education or other adult population settings, I examined the metrics provided by *Google Scholar*. As a part of its *Google Scholar* platform, *Google* ranks journals in a variety of field and sub-fields based on the h5-index and h5-median for the journal.

- h5-index is the h-index for articles published in the last five complete years. It is the largest number h such that h articles published in 2011-2015 have at least h citations each.
- h5-median for a publication is the median number of citations for the articles that make up its h5-index (Google Scholar, 2017).

Essentially, an h5-index of 20 would mean that at least 20 articles in the last five years had been cited 20 times each. In order for that number to increase to 21, all 20 of these articles would need to be cited at least one more time, and a new article (i.e., the twenty-first article) would also need to be cited at least 21 times. Further, an h5-median of 45 simply means that the median number of times the 20 articles mentioned above were cited was 45 times. Basically, both are measures of how much impact a journal is having on other research in the field by how many times the articles that it is publishing are being cited.

There is no field or sub-field specifically for distance, online, or blended learning. However, there is a sub-category of "educational technology" that is contained under the main category of "social sciences." The results for "educational technology" are presented in Table 1.

**Table 1. *Google Scholar* metrics for journals in the "Educational Technology" sub-category**

| Rank | Publication | h5-index | h5-median |
|---|---|---|---|
| 1. | Computers & Education | 88 | 121 |
| 2. | British Journal of Educational Technology | 48 | 66 |
| 3. | The Internet and Higher Education | 43 | 68 |
| 4. | Journal of Educational Technology & Society | 41 | 62 |
| 5. | Journal of Computer Assisted Learning | 40 | 63 |
| 6. | The International Review of Research in Open and Distributed Learning | 38 | 85 |
| 7. | Educational Technology Research and Development | 32 | 50 |
| 8. | International Conference on Learning Analytics and Knowledge | 32 | 49 |
| 9. | Australasian Journal of Educational Technology | 31 | 47 |
| 10. | International Journal of Computer-Supported Collaborative Learning | 28 | 38 |
| 11. | IEEE Transactions on Learning Technologies | 27 | 42 |

| Rank | Publication | h5-index | h5-median |
|---|---|---|---|
| 12. | TOJET: The Turkish Online Journal of Educational Technology | 26 | 48 |
| 13. | TechTrends | 26 | 40 |
| 14. | Distance Education | 25 | 47 |
| 15. | Language, Learning & Technology | 25 | 35 |
| 16. | ReCALL | 24 | 36 |
| 17. | Computer Assisted Language Learning | 23 | 37 |
| 18. | CALICO Journal | 23 | 34 |
| 19. | Journal of Educational Computing Research | 22 | 36 |
| 20. | Journal of Online Learning and Teaching | 22 | 33 |

*Note: Numbers 1 through 5 are the top five "educational technology" journals. Numbers 6, 14, and 20 – the International Review of Research in Open and Distributed Learning, Distance Education, and Journal of Online Learning and Teaching – have a focus on distance, online, and/or blended learning*

For the purposes of this report, based on a review of the title and abstract, I selected the most cited article in each of the top five "educational technology" journals that had a focus on distance, online, and/or blended learning to review. Additionally, I also selected the most cited article in each of the journals that had a focus on distance, online, and/or blended learning to review.

## Results

In this section I will provide a brief summary of each of the articles from the top five "educational technology" journals and then the journals that had a focus on distance, online, and/or blended learning, along with some commentary on why they may be relevant to the K-12 environment. However, before I present these results I did want to provide some contextual information. As you review the information below, it is important to keep in mind that the most cited article with a K-12 focus in the *International Review of Research in Open and Distance Learning* based on these metrics was Hawkins, Barbour, and Graham (2012) in the thirty-eighth position, which had 38 citations (i.e., this was the last article to be included in the journal's h5-index of 38). There were no articles focused on K-12 distance, online, and/or blended learning in the top 25 articles listed for *Distance Education* or in the top 22 articles listed for the *Journal of Online Learning and Teaching* (i.e., all of the articles included in each journal's h5-index).

### Educational Technology Journals

First, the seventh most cited article included in the h5-index for *Computers & Education*, with a total of 275 citations, was:

Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education, 57*(4), 2333-2351.

The article, which was premised on the fact that the use of online and blended learning was increasing in higher education, was based on a systematic qualitative review of literature related to online formative assessment within that context. The authors found that the most common forms of formative assessments that were used included self-test quiz tools, discussion forums, and e-portfolios. The literature review outlined several benefits to online formative assessments, which included "improvement of learner engagement and centrality in the process as key actors, including the development of a learning community" (p. 2333). The authors suggested that "effective…

ongoing authentic assessment activities and interactive formative feedback… can foster a learner and assessment centered focus through formative feedback and enhanced learner engagement with valuable learning experiences" (p. 2333).

As a part of their review, the authors affirmed the seven principles of effective formative feedback.

1. Helps clarify what good performance is (i.e., goals, criteria, expected standards).
2. Facilitates the development of self-assessment (i.e., reflection) in learning.
3. Delivers high quality information to students about their learning.
4. Encourages teacher and peer dialog around learning.
5. Encourages positive motivational beliefs and self-esteem.
6. Provides opportunities to close the gap between current and desired performance.
7. Provides information to teachers that can be used to help shape teaching. (Nicol & Macfarlane, 2006, p. 205)

From a K-12 perspective, these principles are likely a useful starting point for any practitioner of K-12 distance, online, and/or blended learning interested in incorporating formative assessment into their teaching.

Second, with a total of 168 citations, the third most cited article included in the h5-index for *British Journal of Educational Technology* was:

Akyol, Z., & Garrison, D. R. (2011). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *British Journal of Educational Technology, 42*(2), 233-250.

The article reports on a study related to the Community of Inquiry (CoI) framework, specifically cognitive presence. The study was conducted with a graduate level university course focused on the topic of blended learning delivered, first in an online format and then later in a blended format. The authors collected data that included a CoI survey, participation in an asynchronous online discussion forum, students' achievement scores, and student and teacher interviews. The findings indicated that:

> in both environments students' level of cognitive presence revealed in online discussions was found to be high, ….time was identified as a barrier in online discussions in terms of reaching resolution, ….students in both courses believed that there was a high degree of learning…. [and] given that all findings related to learning were high, it can be concluded that cognitive presence in a community of inquiry is strongly associated with high levels of perceived learning. (pp. 245)

Essentially, the cognitive presence that students experience is connected to both the perceived and actual level of student learning.

In their conclusion, the authors quoted Hannafin and Kim (2003), suggesting that instructors and researchers must focus on the questions of "What has been learned? [and] How did understanding evolve?" (p. 348) – particularly through the lens of the CoI framework. From a K-12 perspective,

those who design and deliver distance, online, and blended courses could use the three presences (social presence, cognitive presence, and teaching presence) as a guideline within their own instructional design and/or pedagogical practice. Further, this article is a good example of incorporating a theoretical or conceptual framework as the basis for research, something that has been almost completely absent in the scholarship focused on K-12 distance, online, and blended learning.

Third, with a total of 332 citations, the second most cited article included in the h5-index for *The Internet and Higher Education*, was:

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education, 14*(2), 129-135.

This article reported a study that examined how researchers used and defined terms such as distance learning, online learning, and e-learning. The authors conducted a review of two decades worth of literature focused on how researchers had defined these three terms and surveyed more than 40 researchers attending a single educational technology conference, as well. The findings indicated that there was little consistency in how researchers used or defined these terms. Further, there seemed to be a consensus from those surveyed that the specific term used did not matter; however, if they had to choose one term that researchers should use for the sake of consistency, it would be "online learning" or "online learning and e-learning."

The authors did state that one of the reasons this line of inquiry was important was because "it is difficult for researchers to perform meaningful cross-study comparisons and build on the outcomes from the previous studies" (p. 129). This sentiment is of particular importance for researchers within the K-12 distance, online, and blended learning context. Since the field first began, K-12 researchers have used terms such as distance education, virtual schooling, cyber schooling, online learning, e-learning, blended learning, hybrid learning, etc. While recent scholarship has been more careful to use specific terms in particular ways (e.g., virtual school to refer to supplemental online learning, cyber school to refer to full-time online learning, and online learning as a more general, overview term), this has not always been the case. As the authors of this article suggest, the failure to use terms describing K-12 distance, online, and blended learning consistently has often prevented researchers from building on what was already known or has led to researchers making inaccurate comparisons from previous research.

Fourth, the most cited article included in the h5-index for *Journal of Educational Technology & Society, 15*, with a total of 196 citations, was:

Greller, W., & Drachsler, H. (2012). Translating learning into numbers: A generic framework for learning analytics. *Journal of Educational Technology & Society, 15*(3), 42-57.

The main purpose of this article was to propose a framework for learning analytics (see Figure 1).

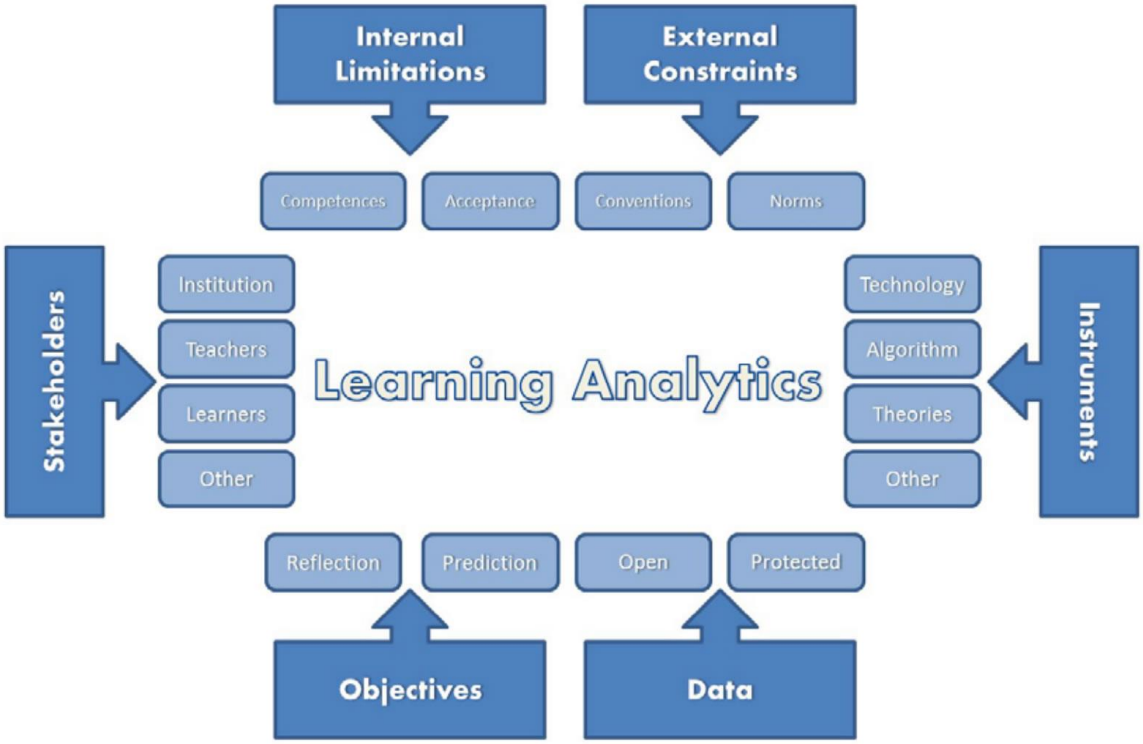


**Figure 1. Critical dimension of learning analytics (p. 44)**

The authors described in detail, using supporting literature and specific examples for the reader, each of the variables presented in the figure above. The article also included a discussion of some of the potential barriers and limitations to this particular framework, as well as the process of learning analytics in general.

The authors underscored the importance of the fact that pedagogical behaviors will generate learning analytics, which will provide data on the consequences of that pedagogy. Based on these consequences, instructors and/or programs would have a data-driven rationale for maintaining or modifying the original pedagogical behaviors. From a K-12 perspective, the potential of learning analytics in the distance, online, and blended learning context is tremendous. Through the learning management system and the student information system, K-12 distance, online, and blended learning environments generate a considerable number of data points. However, to date there has been little research into how that data can be used to improve individual pedagogy and/or overall program outcomes. Further, while there has been some reference to this practice being implemented by commercial providers of K-12 distance, online, and blended learning, it would appear that the practice of using learning analytics as a pedagogical tool in the field is quite limited. The potential of a formal framework, like the one proposed in this article, would be significant.

Finally, the fourteenth most cited article included in the h5-index for *Journal of Computer Assisted Learning*, with a total of 76 citations, was:

Darabi, A., Arrastia, M. C., Nelson, D. W., Cornille, T., & Liang, X. (2011). Cognitive presence in asynchronous online learning: a comparison of four discussion strategies. *Journal of Computer Assisted Learning, 27*(3), 216-227.

The article is situated by the fact that much of the previous research has found or argued that online learners do not achieve cognitive presence or higher level learning; the authors propose online discussion forums as a way to attempt to bridge that gap. Further, the authors stated that "the conventional approach to online discussion — asking probing questions — does not necessarily advance the discussion through the phases of cognitive presence: triggering events, exploration, integration, and resolution, which are crucial for deep knowledge construction" (p. 216). The actual research study examined four different scenario-based online discussion strategies (i.e., structured, scaffolded, debate, and role play) with an online section of an undergraduate course. The authors found that:

> (T)he structured strategy, while highly associated with triggering events, produced no discussion pertaining to the resolution phase. The scaffolded strategy, on the other hand, showed a strong association with the resolution phase. The debate and role-play strategies were highly associated with exploration and integration phases.

The authors concluded that "discussion strategies requiring learners to take a perspective in an authentic scenario facilitate cognitive presence, and thus critical thinking and higher levels of learning" (p. 216).

It is somewhat interesting that this article happened to be the most cited one focused on distance, online, and/or blended learning in the *Journal of Computer Assisted Learning*, as the content and the results are quite complimentary to the Akyol and Garrison (2011) article. The earlier article underscored the potential of online discussions as a means to generate cognitive presence, which Akyol and Garrison found to be connected with perceived and actual student learning. In this article, Darabi et al. (2011) suggested that scenario-based online discussion strategies could be an effective way to achieve that cognitive presence in online discussion forums. This guidance could prove to be useful for teachers in the K-12 distance, online, and blended learning environment. Further, this study is another example of researchers using a theoretical or conceptual framework— in this case a component of the CoI framework — to guide their research study.

### Distance, Online, and/or Blended Learning Journals

First, the most cited article in the *International Review of Research in Open and Distance Learning* had a total of 472 citations.

Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. *International Review of Research in Open and Distance Learning, 12*(3), 80-97.

The abstract of this article indicates that the authors examine the pedagogy used over three generations of distance education (i.e., cognitive-behaviorist, social constructivist, and connectivist pedagogy) using the CoI framework. While the authors situate the generations around pedagogy, each of the three pedagogies is loosely associated with a specific form of distance education

technology (i.e., correspondence, online learning, and massive open online courses). The article provides a useful illustration of how the pedagogy used by those involved in distance education has both evolved as the technology has changed, but has also built on the pedagogical lessons learned using technology from the previous generation.

At present, even though the nature of the tools used in distance, online, and blended learning have evolved and continued to change, in many circumstances the pedagogy has not. Numerous instances of distance education use the latest technologies, but the content is still delivered in a static fashion. From a pedagogical standpoint, there is not much difference between a printed lecture from a correspondence model of distance education and a highly interactive lecture in an online format. In both instances, the method of delivery is still primarily a form of direct instruction. From a K-12 perspective, it is fairly well documented that much of the distance, online, and blended learning that is provided often falls into the cognitive-behaviorist pedagogies. As such, the discussion of various strategies associated with the social constructivist pedagogy and the connectivist pedagogy would be quite useful for K-12 distance, online, and blended teachers. Also, similar to several of the examples above, this is another illustration of research that makes use of a theoretical or conceptual framework. The consistent use of a similar framework by all of these researchers allows them to continue building upon what is known about this framework from a research perspective and how practitioners could operationalize it.

Second, the most cited article in *Distance Education* had a total of 156 citations.

Baran, E., Correia, A. P., & Thompson, A. (2011). Transforming online teaching practice: critical analysis of the literature on the roles and competencies of online teachers. *Distance Education, 32*(3), 421-439.

This article reports a critical literature review that drew on research from the previous 20 years that related to online teaching. After an extensive search of the literature, the authors chose to focus on 11 key articles on higher education online teacher roles and competencies. Based on this review of the literature the authors found:

> that while research about online teacher roles and competencies guides the development of teacher preparation and training programs, it lacks in terms of addressing the issues of empowerment of online teachers, promoting critical reflection, and integrating technology into pedagogical inquiry. (p. 421)

However, the authors recommended that practitioners should approach their online teaching from the perspective of being a learner that continuously reflects to refine their practice.

The authors concluded there were numerous online teacher roles identified in the literature (e.g., managerial, instructional designer, pedagogical, technical, facilitator, and social roles) and suggested several competencies for each role, depending on the context in which the online teaching was being performed. Within the K-12 context, it has become commonly accepted that teachers in the distance, online, and blended learning environments have become diffused into three separate roles: designer, teacher, and facilitator (Davis et al., 2007; Ferdig, Cavanaugh, DiPietro, Black, & Dawson, 2009). However, to date there have been little to no research-based standards or

competencies developed for the K-12 environment; the results of this kind of critical literature review can be the first step in the development of research-based standards and/or competencies for the K-12 distance, online, and blended learning environment.

Third, the most cited article in *Journal of Online Learning and Teaching* had a total of 136 citations.

Milligan, C., Littlejohn, A., & Margaryan, A. (2013). Patterns of engagement in connectivist MOOCs. *Journal of Online Learning and Teaching, 9*(2), 149-159.

This article focuses on the nature of engagement within a connectivist-focused massive open online course (MOOC). Connectivism is a pedagogical approach that views learning "as residing in the connections that exist between people and digital artifacts within this ubiquitous network" (p. 149), and it is commonly associated with cMOOCs (i.e., not the kind of MOOC offered by Coursera, EdX and other large scale providers). The study used student data generated from the *Change11* MOOC[1] that was offered from September 2011 to May 2012, as well as interviews with 29 of the over 2,300 participants that registered for the MOOC. The authors reported that there were three different types of engagement (active participation, passive participation, and lurking), and the specific type of engagement was often influenced by the learner's confidence, prior experience, and motivation.

The authors described how active participants were the group of learners that got the most out of creating and sharing artifacts, but that almost all of the active participants were also those that had previous experience with this form of online learning. Conversely, the passive participants and the lurkers tended to be participating in their first MOOC. However, the authors did note that both passive and lurking learners might still benefit from the content of the course; they simply did not contribute to the larger community. From a K-12 perspective, many of the students that enroll in distance, online, and blended learning courses are doing so for the first time. Ensuring that courses are designed in such a way that they can benefit from the content of that course as a passive participant or lurker is important. Similarly, the results of this article suggest that teachers should seek to leverage those students who are more experienced with online learning to model that active participation within the online learning community. Finally, like the studies that used the CoI framework, this study also incorporated the use of a theoretical or conceptual framework to guide the research.

## Lessons for K-12 Distance, Online, and Blended Researchers

Rice (2006) suggested that the research into K-12 distance, online, and blended learning followed a similar pattern to research in adult settings (i.e., by focusing initially on comparing student performance between traditional and technology-mediated environments). This observation was accurate; and as the field of distance, online, and blended learning in higher education matured, research in the field shifted from these comparative studies to focusing more on issues related to the design, delivery, and support of distance, online, and blended learning. As the practice of distance, online, and blended learning is more mature in higher education, it behooves researchers in

[1] See http://change.mooc.ca/

the field of K-12 distance, online, and blended learning to be familiar with promising research that is being conducted in the adult environment.

A review of the studies described above identified several themes that should provide guidance for researchers of K-12 distance, online, and blended learning. The first lesson from these studies is the use of theoretical or conceptual frameworks to guide that research (Akyol & Garrison, 2011; Anderson & Dron, 2011; Darabi et al., 2011; Greller & Drachsler, 2012; Milligan et al., 2013). Theoretical or conceptual frameworks are a collection of related variables that are believed to act or interact in certain ways under certain conditions that allow researchers to create a model that can be used by other researchers or that can be tested. To date, one of the few lines of inquiry that has attempted to ground itself with a theoretical or conceptual framework is the work of Borup and his colleagues (Borup, 2016a, 2016b; Borup, Graham, & Drysdale, 2014; Borup & Stevens, 2016; Borup, Stevens, & Hasler Waters, 2015). The Adolescent Community of Engagement (ACE) framework was introduced by Borup, West, Graham, and Davies (2014) as a way to describe the nature of engagement that occurs in a distance, online, and blended learning course by examining the variables of student engagement, teacher engagement, peer engagement, and parent engagement. Borup and his colleagues have used this framework to specifically examine the parent engagement aspect of the ACE framework at a specific cyber charter school.

Another example would be the use of social presence theory by Amy Garrett Dikkers and Aimee Whiteside (Dikkers, Whiteside, & Lewis, 2013; Whiteside & Dikkers, 2012), which posits that technology-mediated communication can have varying levels of relative significance for the individuals involved. Social presence is actually one of the three presences that are included in the CoI framework. Seven years after the CoI framework itself was first introduced, Garrison and Arbaugh (2007) examined the research that had been conducted during that time using the framework. As a part of that discussion, the authors called for additional research into "(1) the need for enhanced methodological and analytical rigor in future studies; (2) the need for conceptual refinement of the relationships and interactions between/among the elements, both particularly and collectively; and (3) the need for testing the framework in disciplines other than education" (p. 165). There is no reason additional research in one of these three areas could not occur in a K-12 distance, online, and/or blended learning setting. For example, in describing the second area, Garrison and Arbaugh stated that "much of the research on the framework to date has focused on one particular presence rather than on the nature of the relationship between the types of presence" (p. 167).

A second lesson for researchers of K-12 distance, online, and blended learning is focused on the use of validated instruments as a part of the research tools (Akyol & Garrison, 2011; Darabi et al., 2011; Milligan et al., 2013). A lack of validated instruments means that researchers must develop their own instruments for each and every study they conduct, and there is no guarantee that the instrument will actually measure what it is designed to measure or how well it will reflect the complete reality of a particular context. To date, the only lines of inquiry that have undertaken the task to develop and validate an instrument within the field have been the Educational Success Prediction Instrument (ESPRI) (Roblyer, 2005; 2006; Roblyer, Davis, Mills, Marshall, & Pape, 2008; Roblyer & Marshall, 2002-2003) and an instrument based on the Parental Involvement Mechanisms Model (Liu, Black, Algina, Cavanaugh, & Dawson, 2010).

For example, the ESPRI was developed to "help predict which high school students would be likely to succeed in online courses and provide a basis for counseling and support for other students interested in becoming online learners to help them become more successful" (Roblyer & Marshall, 2002-2003, p. 241). The initial validation study of the ESPRI found that the instrument had a reliability level of 0.92 with a sample of 135 online learning students, while a follow-up study with a sample of 4,100 online learning students also found the ESPRI had a reliability level of 0.92 (Roblyer, Davis, Mills, Marshall, & Pape, 2008). However, there has been little use of this instrument within the academic literature since 2008; there has also been a continued absence of the use of validated instruments in general. Interestingly, the CoI framework does have an instrument that has been validated with adult populations (Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson, & Swan, 2008). This presents an opportunity for researchers of K-12 distance, online, and blended learning to potentially use a validated instrument, while situating their research within a larger theoretical or conceptual framework.

A third and final lesson for researchers of K-12 distance, online, and blended learning from the studies described above is focused on defining the characteristics of what is being researched (Akyol & Garrison, 2011; Anderson & Dron, 2011; Moore et al., 2011). Moore et al. (2011) emphasized the importance of the careful use of terms within distance, online, and blended learning. For the most part, researchers within the field have generally used the term K-12 online learning when referring to the field as a whole (Barbour, 2013). Further, virtual schools have often been used for programs where students took one or more courses in a supplemental manner, while cyber schools have often been used for programs that had students engaged in full-time online instruction. However, it would be somewhat inaccurate to suggest that all scholars have maintained these distinctions.

As a part of their annual *Keeping Pace with K-12 Digital Learning* studies, Watson, Gemin, Ryan, and Wicks (2009) introduced a matrix as a more robust means to describe K-12 online and blended learning programs (see Table 2).

**Table 2. Dimensions for describing K-12 online and blended learning programs**

| Dimension | Variables |
|---|---|
| Comprehensiveness Reach | district, multi-district, state, multi-state, national, global |
| Type | district, magnet, contract, charter, private, home |
| Location | school, home, other |
| Delivery | asynchronous, synchronous |
| Operational Control | local board, consortium, regional authority, university, state, independent vendor |
| Type of Instruction | fully online, blending online and face-to-face, fully face-to-face |
| Grade Level | elementary, middle school, high school |
| Teacher-student Interaction | high, moderate, low |
| Student-student Interaction | high, moderate, low |

For example, the *Michigan's K-12 Virtual Learning Effectiveness Report* produced by the *Michigan Virtual Learning Research Institute®* has consistently found that students enrolled in *Michigan Virtual School®* (*MVS®*) had higher completion and passing levels than those enrolled in local courses other than those delivered by *MVS*, who had higher completion and passing rates than students enrolled in

full-time, public cyber schools (Freidhoff, 2015, 2016; Freidhoff, DeBruler, & Kennedy, 2014). However, it is important to look beyond these surface level results to the conditions that produce those results (and the authors themselves acknowledge that fact). For example, the *MVS* is a statewide, supplemental program primarily focused on high school students enrolled in brick-and-mortar schools. The student to teacher ratio is relatively low, allowing for higher levels of student-teacher interaction. *MVS* courses are largely offered on a scheduled timetable, allowing for higher levels of student-student interaction. All of these variables, and many others to be sure, are important to unpacking, understanding, and investigating these initial findings in greater detail. These individual variables are also important when drawing comparisons between *MVS* and other statewide supplemental programs. The regulatory environment in Michigan, the specific conditions under which the online learning is provided, and the nature of the *MVS* program itself all influence the ability for researchers to draw conclusions about the findings in Michigan with other jurisdictions. This example underscores the importance of specificity in the terms researchers use to describe the individual programs with which they study.

## Lessons for K-12 Distance, Online, and Blended Practitioners

In addition to providing lessons for researchers, the higher education studies described earlier also provide guidance for practitioners of K-12 distance, online, and blended learning. The first lesson is focused on the fact that there are promising practices in the research with adult populations. While K-12 researchers have regularly argued that the nature of the child and adolescent learner is different than the adult learner (Barbour & Reeves, 2009; Cavanaugh, 2013), there are likely research-based instructional design and pedagogical practices from adult contexts that have relevance in the K-12 environment. For example, Gikandi et al., 2011 reported on the importance of formative assessment — and provided seven principles from Nicol and Macfarlane (2006) as guidance for practitioners. The importance of formative assessment has also been found to be of great importance to student success in the general K-12 environment (Hattie, 2009; Hattie & Marsh, 1996; Marsh & Hattie, 2002). While there is no research specific to K-12 distance, online, and/or blended learning that has reported this particular finding, the fact that it has been found to be important in the general K-12 environment and with online learning in adults suggests that it may be a promising practice for K-12 distance, online, and blended practitioners to focus on. This is not to suggest that there isn't a need to examine instructional design and pedagogical practices that are specific to the K-12 context, only that a good starting point may be what has been found to be effective within the adult context — particularly for practitioners who cannot afford to wait for K-12 research to catch up.

The second lesson for practitioners of K-12 distance, online, and blended learning is focused on the potential use of learning analytics. To date, there has been little literature to support designers, teachers, or administrators in their use of analytics to improve how they design, deliver, and support their learning. However, there have been some examples that can provide guidance to practitioners. Dickson (2005) reported "the course statistics [in the learning management system (LMS)] offer a potentially informative, fine-grained look at what is actually going on inside a given course for each individual student" (p. 9). Using this kind of LMS data, Lowes, Lin, and Kinghorn (2016) reported that "females were more active than males and that a higher degree of online activity and discussion forum viewing and posting was associated with better final grades, but the correlation was stronger for males than it was for females" (p. 100). It is this kind of information that can have meaningful

impact on strategies that practitioners employ — provided practitioners are first able to access and then analyze the data. These potentially significant implications for practice provide a strong rationale for K-12 distance, online, and blended learning programs to provide specific training to their practitioners on how to access and analyze LMS data, as well as strategies for using those results to improve their own practice.

The third and final lesson for practitioners of K-12 distance, online, and blended learning is focused on the use of theory in practice. For example, the most researched theoretical or conceptual construct in recent years within the higher education literature has been the Community of Inquiry framework. The CoI framework was introduced by Garrison, Anderson, and Archer (2000), where the authors argued that the educational experience of those learning at a distance was impacted by the social presence, cognitive presence, and teacher presence that they reported. The authors described teaching presence as "the design, facilitation, and direction of cognitive and social processes" (Anderson, Rourke, Garrison, & Archer, 2001, p. 5); social presence as "the ability of participants in the [CoI] to project their personal characteristics into the community" (Garrison et al., 2000, p. 89); and cognitive presence as individuals' ability to "construct meaning through sustained communication" (p. 89). Essentially, if practitioners are able to exhibit a high level of teaching presence and social presence, then it should create an environment conducive to students exhibiting a high level of cognitive presence.

Another example is Moore's theory of transactional distance. Moore (1983) stated that the "distance between learner and teacher [was] not merely geographic, but educational and psychological as well" (p. 155). The level of transactional distance that a learner experiences is "determined by the amount of dialogue that occurs between the learner and the instructor, and the amount of structure that exists in the design of the course (McIsaac & Gunawardena, 1996, p. 407), as well as the level of learner autonomy. Structure "expresses the rigidity or flexibility of the course's educational objectives, teaching strategies, and evaluation methods" (Moore & Kearsley, 1996, p. 203), while dialogue refers to the amount, nature, and type of communication between the teacher and the learner. Given that many of the students enrolled in K-12 distance, online, and blended learning environments have lower levels of autonomy (Barbour, 2013), the theory of transactional distance would recommend an online learning environment that provides a greater level of flexibility in the course structure and a high level of student-teacher dialogue.

## Summary

Many researchers of K-12 distance, online, and blended learning will often refer to the fact that research in the field — or whatever specific aspect of the field they are examining — is scarce, still developing, or just emerging. While this is true in many respects, there is a growing body of literature that examines a variety of topics related to K-12 distance, online, and blended learning. Researchers in the field also have the ability to seek guidance in the research that has been done in distance, online, and blended learning with adult populations. For example, researchers can borrow instruments that have been validated in studies with adult learners and apply those instruments to child and adolescent populations (possibly re-validating these instruments with this specific population). Researchers can also ground their studies in established theoretical and conceptual frameworks like the theory of transactional distance, the theory of social presence, the CoI framework — just to name a few. As the research continues to mature, researchers need to ensure

that their methodological techniques continue to become more sophisticated. If research in the field is ever going to reach a point where it can truly guide the practice of K-12 distance, online, and blended learning without having to provide numerous caveats and qualifications, following in the footsteps of our colleagues who conduct research with adult populations will be required.

From a practitioner standpoint, it is important to underscore that while there may be differences between K-12 and adult learners, practitioners must begin to explore promising practices that have been shown to have success in adult contexts, as the amount of available research with adult populations is much more extensive than what is available for K-12 populations. Further, one of the true advantages of K-12 distance, online, and blended learning is the fact that because it is mediated with technology, there is a tremendous amount of data that is generated. If practitioners can leverage this data, there is a great potential for these analytics to inform practice — and with an absence of models from K-12 researchers, research from adult populations is required to provide guidance. Finally, it is not uncommon for practitioners to have a negative view of educational theory (Geelan, 2006). However, there is potentially much guidance for the design, delivery, and support of K-12 distance, online, and blended learning contained in the parameters of various theories, as well as different theoretical and conceptual frameworks.

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