Special Issue: Connecting Research and Practice to Understand Efficacy in K-12 Blended Learning

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OBJECTIVE OF THE SPECIAL ISSUE

The implementation of blended learning environments in K-12 settings is increasing and, with it, the need for research that answers questions from implementers or offers solutions to problems of practice. In order to contribute to meeting those needs, this issue includes manuscripts that document and situate evidence about the effectiveness of learning within blended environments through a practice-oriented lens. We seek to understand not just *if* blended learning is effectively implemented, but also *how*, and *when*. Our goal is to begin to build a body of evidence-based practice that can guide practitioners and decision-makers interested in best meeting their students' needs.

Blended learning is defined here as the integration of technology with in-person learning, which can be used to facilitate known effective instructional strategies including but not limited to individualized instruction (Alexander & Murphy, 1998; Bloom, 1984; U.S. Department of Education, Office of Educational Technology, 2014; Vosnaidou, 2001), mastery learning (National Center on Universal Design for Learning, 2011), the promotion of transfer through varying contexts and representations (National Research Council, 2000), and formative assessment (Pashler et al., 2007).

This issue adds to a lively and growing conversation in the field about the type of research questions that remain to be answered, the type of research designs that can answer those questions in a timely manner, and how best to ensure that research findings are used in the field to improve practice. For example, groups like my own organization (The Learning Accelerator), the Michigan Virtual Learning Research Institute, the International Association for K-12 Online Learning, Digital Promise, and the Learning

Assembly have all acknowledged the importance of connecting research and practice to build and implement the evidence base for personalized or blended learning. The four studies published here, while varied in approach and content, add to this growing knowledge base and help illuminate what evidence-based practice could and should look like when blending instruction.

The Contributions

The first of these four studies, "Using Blended Teaching to Teach Blended Learning: Lessons Learned from Pre-service Teachers in an Instructional Methods Course," by Kristen Shand and Susan Glassett Farrelly, focuses on 38 pre-service teachers' experiences in a blended course, giving us a view of blended learning from the educator-as-student perspective. This approach hinges on the premise that experiencing blended teaching will help these future instructors blend their own classrooms, keeping their instructional goals and their future students' experiences in mind. One of the benefits of this experience was the facilitation of the soon-to-be teachers' reflections on the best instructional reasons for blending. Pre-service teachers, through being students of blended instruction, also considered the best ways to blend instruction, taking their content, students, and other contextual factors into consideration. Studies like these help uncover the types of supports that enable instructors to use blended learning as a tool for providing the instruction that will best meet the needs of their students. Rather than simply being an initiative to be implemented, blended learning can add valuable tools to teachers' toolkits. Understanding how pre-service experiences help teachers access these tools is critical to ensuring that blended learning scales in ways that provide effective learning experiences to students.

In "Disconnected Data: The Challenge of Matching Activities to Outcomes in Online Learning," Connell, Johnston, Hall, and Stahl outline their challenges in using already-collected data for the purposes of identifying and understanding underlying relationships between characteristics of students, courses, learning environments, and learning outcomes. More correlational studies like this are needed to support educators in understanding which instructional strategies best support which students and which instructional needs. As the authors discovered, however, even though data are being collected in droves, this does not mean that conducting studies of this type is a simple affair. The challenges encountered are symptomatic of the lack of data interoperability that currently persists, and Connell et al. make several recommendations to researchers, educators, and administrators, as well as educational technology developers and providers, to improve interoperability and allow us to learn from all of the data we are already spending resources on collecting. As with the previous study, understanding how best to structure

data collection, sharing, and the data themselves is critical to getting the most out of the data we are collecting. Educational technology and data systems represent a potential boon for researchers and educators alike, in that there is now much more potential to gather data in a systematic and detailed way than ever before. We must be careful not to squander this opportunity, nor turn it into a pitfall - and studies like these help us navigate the complex issues that can arise when data are plentiful, but may not align with the research and practice questions of interest.

The ideal of personalization would ensure that each student is provided with opportunities that allow them to reach their fullest potential. To this end, in their article, "Attitudes and Achievement in a Self-Paced Blended Mathematics Course," Phoebe Balentyne and Mary Alice Varga turn our attention to high-achieving students in a high school mathematics course. While it is of great interest to ensure that instructional strategies, including those deployed in a blended environment, benefit students with the greatest needs; equally important is ensuring that these strategies also support typically- and high-performing students as well. This study describes the relationship between mathematics performance and attitudes towards mathematics in a self-paced mathematics course. For the 23 students who participated, achievement was correlated with attitudes, implying that students with positive attitudes toward math may benefit the most from self-paced courses. As mentioned before, the goal of this issue was to add to the knowledge base about not just *if*, but also *when*, and *how* blended learning is effective. The conditions under which, and constituents for whom implementation is more or less likely to be effective are central to our understanding of the best times to use particular strategies within certain learning environments. Conducting studies of high-, typical, and low-performing students in different content areas helps paint a fuller picture of the supports that blending can provide.

The final study, "Understanding a High School Blended Learning Environment from the Perspective of Complex Systems," by Barros, Simmt, and Maltempi, puts all of the aforementioned pieces together to investigate a blended high school classroom as a *complex system*. The authors describe the interactions in a blended high school mathematics class in Brazil, using the framework of complex systems to understand the many interactions that take place. Through documenting and describing student-student and student-teacher interactions in both in-person and online environments, the complex systems framework underscores the ability of blended learning environments to promote students' agency in making their learning personally relevant. When conceptualized as a complex system, it was also found that blended environments facilitate collaborative learning in both online and in-person settings. It is hard to isolate specific strategies or components of

complex instructional frameworks such as blended learning environments in order to understand the mechanisms through which effective learning is being realized, or if this is the case. Turning to theoretical frameworks from other fields, such as the complex systems framework, can help to identify and conceptualize the processes that are occurring in blended classrooms, again to better understand the mechanisms through which implementation is related to outcomes.

Ongoing Need

This issue is a step toward calling attention to the breadth of research that is needed to support the implementation of evidence-based practices in blended learning to meet the needs of all students. Far from being a comprehensive or definitive issue, it aims to open the doors to more work that is relevant to the needs of educators in today's classrooms around the globe. The number of submissions we received, and the number included here are indicative of the relative youth of the field, as well as the pace of research compared to practice. We look forward to future work from these and other authors as more is learned about if, when, and how blended learning can be effectively implemented to support all students.

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