Strategies revealed for effective delivery of K-12 online education

August 11 2022, by Laura Oleniacz

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North Carolina State University researchers released findings from an analysis of 284 different studies on the challenges and best practices for teaching K-12 classes online—an effort launched during the COVID-19 pandemic to help teachers and administrators as they transitioned rapidly

to online instruction.

The researchers used the findings, which have now been published in *Review of Educational Research*, to develop a series of free, online and asynchronous professional development courses for teachers. The courses were provided online to more than 1,000 teachers during the early years of the pandemic.

"We've learned a lot about what works for online instruction in U.S. higher education, but we wanted to see what works for K-12," said the study's lead author Carla C. Johnson, professor of science education at NC State. "We noticed that many teachers hadn't had any training for online instruction; we have been preparing them to teach face-to-face. Ultimately, we found that some of the strategies that worked well in-person also worked online, with some modifications."

In their analysis, researchers searched for existing studies on online, virtual, distance or remote delivery of K-12 education. After reviewing the studies for key themes, researchers revealed three foundational elements needed for effective online instruction: teacher training in online teaching; district and school access to technology and the Internet; and consideration of student developmental level in instructional planning, such as whether students are able to learn independently.

"You have to have a good foundation to build your home on, or you're going to have challenges down the road," Johnson said. "For example, in terms of student development, we know that adults can sit in front of a computer, but when you're thinking about elementary school children, and even some in middle school, teachers need parents' partnership to make sure students are set up to be successful, to have a schedule they follow, and to keep distractions out of the way. Teachers have to think about breaking up instructional delivery into smaller time increments."

In addition, the study revealed a conceptual framework for essential aspects of online K-12 instruction. The first consideration was the course design. Researchers reported courses that were easy to navigate and organized could help reduce students' "cognitive load," or the amount of effort they have to put in to access the course online. "There are a lot of design principles to ensure K-12 students can logistically find things and maneuver online, so it doesn't impede learning," Johnson said.

Another key factor was whether teachers developed a sense of community for students so they could connect socially and emotionally in the online classroom. "There are strategies and tools to make classes more interactive, and to make sure kids don't feel isolated or get lost online—to feel a connection to each other," Johnson said. "When you teach others, or work with others to discuss what you're learning, there are more opportunities to apply the information and develop a deeper conceptual understanding."

Other important factors for teaching successfully online were: accessibility to course information for students of all abilities; a supportive classroom environment; tailored instruction to meet the needs of individual students or student groups; "active learning" strategies that keep students interested or excited; and assessment of student learning in real-time.

A major challenge researchers faced in completing the analysis was that many schools in the United States used online course delivery in limited ways before the pandemic; for example, many schools used online learning for just a single type of course. Learning entirely online was mostly restricted to charter schools for students who chose it. That meant findings from those settings were limited in terms of their application for taking face-to-face schools fully online during a pandemic or in a rapid manner.

"During the transition to online learning, schools took lemons and made lemonade in some cases, but now we need to do more research in the area of K-12 online learning to figure out what is working," Johnson said. "We need to learn how to do this in a better and more effective way moving forward. For example, we found there was very little, if any, research on teaching specific disciplines, such as teaching mathematics and science, online in K-12."

In addition, Johnson said there's a need to address disparities in online resources and teacher training for school systems across the country, as well as making this a focus in teacher preparation programs.

"We need to continue to build resources for schools that don't have as much access to money or training," she said.

More information: Carla C. Johnson et al, Online Teaching in K-12 Education in the United States: A Systematic Review, *Review of Educational Research* (2022). DOI: 10.3102/00346543221105550

Provided by North Carolina State University