Using Online Education to Address the Challenges of Small, Multigrade Schools

Small schools face practical challenges in delivering high-quality education while operating with limited staff and budget constraints in multigrade classrooms. Educators in these schools require support and services that not only increase student learning but also preserve the teachers' bandwidth (the emotional, mental, and physical energy needed to engage in tasks fully).[1] According to the Adventist Education website's statistics, 60 percent of all schools within the Adventist system in the North American Division (NAD) are staffed by fewer than three teachers.[2]

One way teachers in these challenging positions meet the learning needs of students is to seek out innovative alternatives to traditional methods of instruction. Using online education and resources is one such creative alternative that many teachers worldwide have explored. In this article, *online education* will be defined as self-contained teaching and learning that occur independently of the classroom. Learning engagement happens via the Internet, and like the face-to-face classroom, has the following elements: a clear learning progression, alignment to standards, learning outcomes or objectives, and formative feedback (either within the resource or provided by the classroom teacher). This article explores how online education is being used to increase students' learning in small multigrade schools and offers practical applications for educators searching for innovative, research-based teaching methods.

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Addressing Practical Concerns of Small Schools

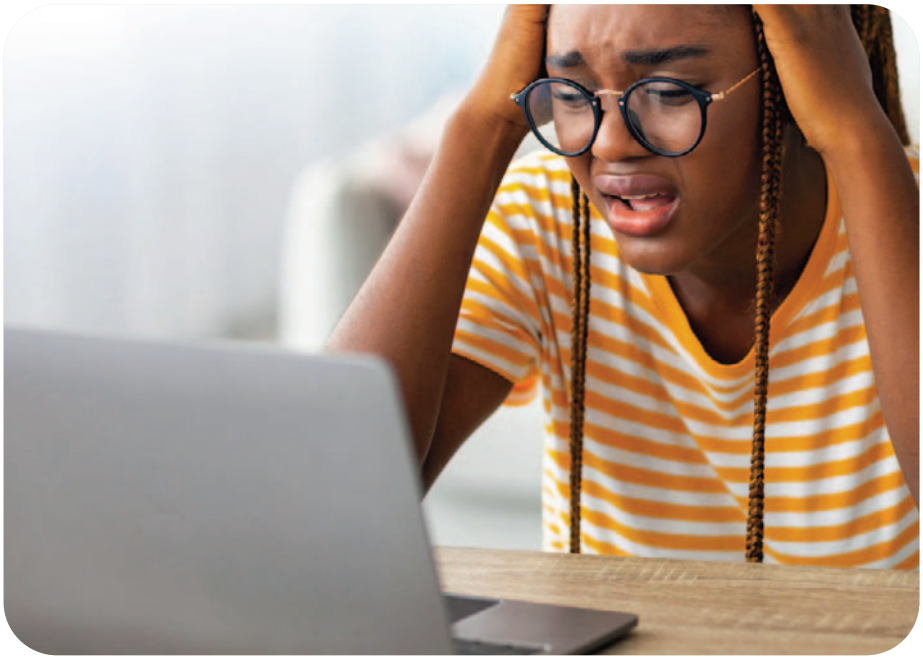
Online education addresses several practical concerns of small schools, such as student access to the curriculum due to a limited instructional capacity to deliver the curriculum. Often in small schools, the number of subjects exceeds the number of qualified teachers available. Increasing teacher positions can be cost-inflating, while training existing teachers can be taxing on the budget and the teachers. Many small and rural schools have addressed these obstacles through technology by integrating hybrid teaching and learning models and exploring ways for their teachers to collaborate with other educators.

There are poignant lessons to learn from the global transition to online.[3] Studies have found that online education using digital tools and resources benefits both teacher and student.[4] Moreover, online education is especially relevant for small schools in rural settings, as it can meet the unique needs of students in small schools.[5] Effective tools for online education include open resources available to all teachers and beneficial online practices such as the integration of asynchronous learning.

Farmer and West found that concerns surrounding online education fell into three main categories: personal, instructional, and relational. Educators need to be aware of the negative outcomes, such as decreased personal interactions and increased screen time, with the addition of online use. It is important for educators to offer balance within the curriculum to ensure that relational and personal needs are met within the classroom. Technology enhancements should be integrated into the classroom with teacher support and monitoring of student learning.

Online Specialists and Collaboration

In Greece, foreign-language instruction is part of the core national curriculum. Children in rural schools on the Greek islands often do not have as much access to foreign-language



(mainly English) instruction as do their urban counterparts.[6] Larger urban schools have more teachers and larger budgets to train teachers in specialized subjects, which creates inequitable educational opportunities for those attending rural schools. To address this inequality, Lymperis[7] explains that these Greek schools have begun collaborations in which urban teachers or language specialists are able to provide instruction delivery online to students attending schools without access to foreign-language instruction. Initial research found that the implementation of hybrid models of teaching and learning increased student achievement (and possibly future access to competitive educational programs) and cost less than hiring a teacher or sending existing teachers for extensive training.

Online education can take the form of teacher collaboration, as modeled in New Zealand rural schools. Schools have partnered to share resources and teaching staff in order to address student needs that cannot realistically be met in small one- and two-teacher schools.[8] McLean et al.[9] found that teachers and principals in rural multigrade schools face additional stress due to the number of responsibilities placed on each staff member.

The Ministry of Education in New Zealand established the Virtual Learning Network (VLN) to address this challenge. This online community of educators allows for reciprocal sharing of resources "utilizing digital technologies to enhance learning outcomes and opportunities for learners."[10] Collaboration enables teachers to digitally share their teaching skills and curriculum across a network of schools, increasing student access to diverse curricula and teaching styles and allowing students in rural settings to have educational experiences that are equivalent to what is offered in schools with more resources.[11]

Asynchronous Learning and Flipped Classrooms

Asynchronous learning began as correspondence education, also known as "distance learning" or "video learning." This format enables sharing of information that does not occur simultaneously and allows students to learn at their own speed and on their own timetable. In comparison, synchronous learning is live, interactive information that occurs in real time. Using asynchronous methods, teachers can delve deeper into content using pre-recorded lessons that students can view and review by taking notes before meeting

in class. Flipped classroom models utilize asynchronous methods in which instruction occurs at home, and hands-on learning occurs in the classroom. These models have been found to increase student achievement and may help to address some of the challenges of multigrade classrooms.[12]

The flipped classroom method is the application of online-to-offline learning that is student-focused and individualized, rather than traditionally teacher-centered. For example, a teacher can assign a Khan Academy instructional math video for students to watch at home. Then, during school, students engage in independent problem-solving practice supported by the teacher. Students are doing what would typically be considered homework in school with the benefit of the teacher to provide guidance for arriving at correct solutions and minimize frustration. This online-to-offline approach increases student interest, independent learning, and deeper reflection.[13] In addition, this mode of learning allows students to balance home and school life and adds flexibility for the educator.[14] With thoughtful preparation and implementation, flipped classroom strategies can be effective for multigrade classrooms.[15]

Open Educational Resources (OERs)

Open Educational Resources (OERs) further expand the possibilities for effective online education and help to address small schools' financial concerns. OERs include both digital and non-digital resources that are readily available without fees for procurement, use, or license.[16] OERs can be created and distributed by individuals or groups and housed in public online locations or spaces for educators to find and share texts, videos, blogs, courses, activities, tutorials, and more.[17] OERs should be vetted for quality, original content, rigor, and alignment to Adventist values. As mentioned above, the vetting should be a collaboration process with other small schools.

Carrete-Marin and Domingo-Penafiel[18] suggest that OERs offer windows of possibility for students and teachers in multigrade settings, particularly rural schools with limited resources. These public and free resources allow educators and students to share, access, edit, and redistribute lessons and materials created with limited-to-no restrictions. Educators may modify materials to meet the needs of the learners in the classroom and accommodate for exceptionalities as needed. Additionally, OERs can reduce costs by replacing traditional textbooks with free open textbooks. Open resources are especially advantageous for teaching multiple subjects and grade levels, and addressing unique learner needs.

> Adaptive technology allows for differentiation and remediation with less impact on the teacher. Artificial intelligence can be used by teachers to improve practice through avatar interaction and simulations that allow teachers to practice teaching methods.

Artificial Intelligence and Immersive Learning Environments

Education has a long tradition of the teacher delivering and the students memorizing information deemed important. Many factors over the years, including research on learning styles, curricula goal changes such as through Common Core, the introduction of online schooling, and advances in technology, have disrupted this traditional view of education and have made it possible for technology to become an important aid in teaching and learning. Artificial Intelligence (AI) can take many forms—from adaptive Web-based programs to robots in the classroom. Artificial intelligence is designed to "learn" student or teacher behavior and adapt accordingly.[19] Adaptive technology allows for differentiation and remediation with less impact on the teacher. Artificial intelligence can be used by teachers to improve practice through avatar interaction and simulations that allow teachers to practice teaching methods. While the training of teachers will require investments in time and money, it will allow teachers and students to engage with sophisticated technology. Simulation classrooms are being used nationwide to prepare preservice teachers and to provide professional development training.[20]

Artificial intelligence simulates human intelligence, while virtual reality (VR) provides immersive learning environments. Immersive learning allows students to learn through experience. Virtual reality in the classroom in its simplest form looks like a virtual field trip. Virtual field trips allow students (especially those in more remote or rural areas) to experience museums, landmarks, or other areas of interest without ever leaving the classroom. In a more-advanced model, virtual reality can allow students to be completely immersed in learning environments, interact with peers in other locations, and complete a variety of educational tasks.[21]

Virtual reality was first embraced in the medical profession so that students pursuing healthcare degrees could practice procedures without patient risk, but it has now become a valuable tool in the K-12 classroom as a customizable immersive learning environment that increases student experience with curricular goals. Small schools can use emerging online technology such as AI and VR to provide students with adaptive, personalized, and immersive learning environments that might not otherwise be accessible. VR technology has become more cost effective for education purposes)[22] and teacher training can be accessed at little to no cost

through several professional-development platforms such as professional conferences and state continuing-education clock hours.

Factors in the Adoption of Online Education

An abundance of online resources and learning models exists for educators, but access to these materials is only the first step. Fullan[23] notes that for sustainable change to happen within the context of education, teachers must believe in the effectiveness of the change and their efficacy in implementing changes. Adopting new technologies in a classroom can be an overwhelming prospect for educators, particularly those already feeling overtaxed or not confident about their technology capabilities.[24] This lack of self-efficacy and capacity to easily determine what is and is not useful in the classroom are the most prominent barriers to success in technology integration.[25] Additionally, educators may have varying perceptions regarding the value of technology overall, which impacts the level to which online learning is integrated. However, in the *Lifeline: A Handbook for Small School Success,* published by the North American Division,[26] small-school educators are encouraged to incorporate technology to improve student learning in all academic areas and workforce skills development, as well as to increase student levels of engagement. Teachers need extensive, good-quality training, mentoring, and follow up to help them feel comfortable with the new approaches and to implement them successfully.

Access to technology does not alone correlate to its acceptance in the classroom or increase students' academic success.[27] Therefore, educators need to determine the usefulness of the proposed educational technology and evaluate their ability to effectively implement it within the classroom. The perceived ease of use and effectiveness in student learning are significant predictors of classroom use. Online-education resources can increase teacher productivity, aid the teacher in personalizing instruction for the student, and increase student engagement in learning.[28]

Action Steps

The following teacher and researcher recommendations are based on evidence and strategies that have benefited small schools. The action steps presented here, together with online resources, have the potential to effectively help small schools and their teachers meet student learning needs while working within budget constraints, time parameters, and the bounds of the educators' personal energy resources:

• *Integrate hybrid teaching and learning models*: Schools and teachers may increase instructional proficiency by integrating online teaching in core content areas and curriculum extensions. For example, a school might add a language course (e.g., Spanish, American Sign Language, Chinese) via an online course or teacher. Such instruction could be delivered either synchronously or asynchronously. Adventist institutions that offer online courses include West Coast Adventist School (https://wcasdl.ca/), Richmond Academy (https://www.rasda.org/), Atlanta Adventist Academy (https://www.aaa.edu/trueconnect), Prairie Adventist School (https://pacesca.nada.org/), and Griggs International Academy, which serves students globally (https://www.griggs.edu/). These schools have established models to support small schools in their capacity to deliver the curriculum.

• *Form a Virtual Learning Network (VLN)*: Like integrating hybrid models, partnering with other teachers and schools in a VLN can create or supplement the collection of resources already available to the school. Schools in a VLN can share curriculum components or content areas. For example, in a VLN with three participating schools, a teacher in one school could teach upper-level math for all three schools, while a teacher in another school teaches upper-level English. A teacher from a third school might provide science instruction, with the labs taking place at the three respective schools. There are many possibilities for such arrangements. Teachers in Adventist schools should work with the conference superintendent to facilitate such collabo-

rations. There are also opportunities for VLNs to connect teaching and learning across conferences, with unions facilitating such collaboration.

• *Flip the classroom*: In a flipped classroom model, students engage in lessons that are taught asynchronously (outside of class time) via video or multimedia. After the lesson, students do guided practice or what otherwise might be called "homework" in class with the teacher. This model requires careful planning by the teacher and robust Internet access by students. Resources such as Nearpod and Edpuzzle[29] allow for both original content creation and the use of premade content. These applications also integrate with learning-management systems such as Google Classroom and Canvas. By using these resources, an educator could build an extensive library of instructional videos, raising the potential for far-reaching benefits to be achieved through the flipped classroom model.

• *Incorporate Open Educational Resources (OERs)*: Small schools can make use of OERs (free and freely adaptable resources) including books, units, lessons, and videos for instruction and assessment. OERs are published under guidelines that are less restrictive than traditional copyright laws, which helps save time and financial resources in planning and implementing materials for the classroom. For example, OER Commons (http://oercommons.org) is an online library of thousands of freely available educational resources. Additionally, there are many "branches" of OER Commons called "hubs" managed by states and other organizations. Hubs like #GoOpen Michigan and the OER Commons Hub: K-12 Teaching and Learning[30] are specially curated collections relevant to K-12 educators. These sources should be vetted to ensure quality, original content, and alignment with the principles of Adventism. The Adventist system has several online, long-distance schools and centralized resources, such as the Adventist Learning Community and CIRCLE websites, which provide numerous examples of lessons, unit plans, and instructional material.

• *Use Adventist Education Resource collections*: Along with taking the above action steps, teachers in small schools are encouraged to use websites and other resources that provide summaries of various available technologies to help them sort through how such materials might be useful in particular contexts.[31] In the context of Adventist education in particular, there are many resources that have already been developed or curated to assist teachers with varying levels of technology. Online professional-development opportunities at the Adventist Learning Community (http://www.adventistlearningcommunity.org) include courses and webinars specifically for small-school teachers. Resources such as the Curriculum and Instruction Center Linking Educators (http://www.circle.adventist.org) and the technology page at http://www.adventisteducation.org are available to support teachers looking to integrate technology and online education into their classrooms. The Adventist Education website was updated in 2022 to be more streamlined for the full range of Adventist education technology.[32]

Online education can lighten the load for the teacher and enhance creativity in teaching and learning using available tools and resources. Becoming aware of the simple and effective use of online tools and resources can change teachers' overall perceptions of technology.

Conclusion

Small multigrade schools are common within the Adventist educational system. These schools require support and streamlining of services to increase student engagement in learning while also preserving teacher bandwidth. Integration of technology and online education offers excellent resources for such schools to implement, especially in contexts where the educator's emotional, mental, and physical reserves are already maxed out, and outside support is low, as is often the case in small schools.

Educators will find it helpful to frame the selection of resources based on their answers to these three questions, which will help them determine whether and to what degree integrating a specific online learning resource will be successful in their classroom:

1. Does it meet student learning needs?
2. Does it address a pragmatic concern associated with small-school teaching?
3. Will it enhance the educator's capacities for what is most important—student engagement?

Not all available online learning opportunities will fit every context. Still, the addition of even just one or two interventions in a small-school context that meet the criteria outlined above could lead to a deeper student understanding and an overall sense of teacher efficacy and empowerment. This, in turn, could increase educators' motivation and create thriving educational environments in small Adventist schools.

Online education can lighten the load for the teacher and enhance creativity in teaching and learning using available tools and resources. Becoming aware of the simple and effective use of online tools and resources can change teachers' overall perceptions of technology.[33] Asynchronous learning strategies positively affect time management and enhance student achievement—a win-win situation. The incorporation of open resources can foster creativity in both students and teachers and meet a range of instructional and learner requirements.

Online education is not a remedy for all challenges, but it may help fill the gap for hectic schedules, unique student needs and differentiation, and stimulate inspiration levels in teaching and learning. ✐

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