

INVESTING IN TECHNOLOGY FOR THE CLASSROOM





SECTION 1: EDUCATING DURING A PANDEMIC

The speed at which the transition occurred was shocking.

At the beginning of January 2020, the WHO (<u>World Health Organization</u>) reported several incidents of pneumonia in Wuhan, China, with cases linked to a new coronavirus.

Cases of infections from the new virus were soon reported in other countries, and the first case in the United States was reported on Jan. 21. By the end of January, the death toll had topped 200, with nearly 10,000 cases reported. The WHO declared a public health emergency on Jan. 31, and the United States followed with its own declaration on Feb. 3. By now, the virus had been dubbed coronavirus disease 2019, or COVID-19. Schools began taking their Spring Break holiday in mid-March, with many students returning from their break to find schools had started transitioning to remote-only instruction.

According to figures from the United Nations organization UNESCO (United Nations Educational, Scientific and Cultural Organization), as the pandemic spread, as much as 91% of the global student population, or nearly 1.6 billion students in 194 countries, found their schools shuttered. Almost 18 months later, educators, parents, and students are still learning lessons about the challenges of educating during a pandemic.

TECHNOLOGY IS CRITICAL

The role of technology in education was becoming apparent even before terms like "COVID-19" and "social distancing" became a regular part of our vocabulary, and the pandemic added fuel to that growth.

Spending with global education technology companies topped <u>\$18.7 billion in 2019</u>, up from \$16.34 billion the previous year, and the market for online education was projected to reach <u>\$319.2 billion by 2025</u>, up from \$187.9 billion in 2019.

Still, the abrupt transition shone a light on weaknesses in the education process when it came to delivering instruction online.

One of the biggest challenges faced by both teachers and students was the so-called "digital divide," where some students were unable to access instruction because they lacked access to a computer and/or the Internet. A <u>2020 Pew Research survey</u> found that 21% of parents with school children at home said it was very or somewhat likely their children would not be able to complete their schoolwork because they did not have access to a computer at home or they would have to use public Wi-Fi. Those issues were especially prevalent in lower-income households.

On the flip side, many teachers struggled because they had never taught in a remote setting. A study published in the education journal <u>Phi Beta Kappan</u> found that more than 92% of teachers had never taught online before the transition. In addition, many teachers reported that technology limitations made their jobs more difficult. Some schools could only offer asynchronous instruction, meaning it was difficult to address student questions in realtime.

WHERE IT GOES FROM HERE

Despite the challenges associated with making the transition to remote instruction and technology-based teaching, a survey published in the education journal <u>Inside</u> <u>Higher Ed</u> found improved attitudes toward online learning among both students and teachers. A majority of students (57%) said they felt more positive about online learning now than they did before the pandemic, while 58% of teachers said the same.

And while many schools prepare to resume in-person classes, it's likely that remote learning, where students attend classes over the Internet in real-time, and distance education, where students work on their own time, will be with us for the foreseeable future. Some schools also plan to begin offering hybrid instruction or a combination of remote and face-to-face classes.

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An April 2021 <u>New York Times report</u> found that several hundred of the nation's 13,000 school districts plan to offer some form of virtual instruction even after the pandemic has subsided, in part because of parental demand. The same month, a survey published by <u>Bay View Analytics</u> in collaboration with several educational companies found that 73% of college students agreed that they would like to take some fully online courses in the future.

74% of college students agreed that they would like to take some fully online courses in the future

"It's an exciting time because people are getting creative," said LeiLani Cauthen, CEO of <u>The Learning Council</u>, in a conversation with experts at <u>Yamaha Unified</u> <u>Communications</u>. The Learning Council is a mission-based organization entirely focused on helping schools and the Ed-Tech industry. The organization conducts the most significant national annual research study in ed-tech change.

"The ones that do, want to help understand that technology is going to be the driving force to make sure that we are keeping students engaged," Cauthen said. "It's key to making sure that they are actually learning and retaining the information."



In response to the turmoil schools faced over the past 18 months because of the COVID-19 pandemic, Congress passed <u>three stimulus</u> <u>packages</u> that included \$280.7 billion in funding designed to help stabilize education budgets. But as is often the case with government funding, the money came with various rules and regulations stipulating what it could be used for.

To help add a bit of clarity to the funding process, let's take a look at each of those stimulus packages and what they mean for investments in new technologies.

March 2020: CARES Act

<u>The Coronavirus Aid, Relief, and Economic</u> <u>Security Act</u>, or CARES Act, was passed by Congress on March 27, 2020, just as the pandemic began to take hold and many schools shifted to remote learning. The bill allotted a total of \$2.2 trillion in economic aid, with \$30.2 billion dedicated to creating an <u>Education Stabilization Fund</u>. \$13.2 billion was designated for K-12 schools, and \$14 billion was designated for higher education. An additional \$3 billion was designated for governors to use at their discretion to support educational institutions in their state. Funding is allocated to states based on their share of Title I, Part A funds, which provide financial assistance to local educational agencies and schools with high numbers of children from low-income families. At least 90% of overall funding must go to Title I schools. Funds to local districts can be used for various COVID-related response activities, including the purchase of educational technology to support online learning.

Higher ed institutions need to spend their funds within one calendar year of receipt. At least 50% of funding must be used for emergency financial aid grants for students. Other funding can be used for activities, including supporting remote learning and the purchase of education technology.

DECEMBER 2020: COVID RELIEF PACKAGE

The second major stimulus bill was <u>passed</u> <u>by Congress in December 2020</u> and signed into law on December 27. Although smaller than the CARES act, it provided \$900 billion in COVID-related aid, including \$82 billion in assistance to educational institutions. \$54 billion was earmarked for K-12 schools, \$22 billion for higher ed, and \$4 billion for governors to use.

The package for K-12 schools came with the same spending requirements as the CARES Act regarding allocating funds for Title I schools. The eligible uses for funding were the same as the CARES Act, with additional uses designed to help address learning loss for those students. School districts are required to use the funds they receive by September 30, 2023.

Higher ed funding in this round must also be spent within one calendar year of receipt, with schools required to spend at least as much as they did under the CARES Act on emergency financial aid grants. The remaining funds can be used for expenses, including providing distance education and purchasing education technology.

MARCH 2021: AMERICAN RESCUE PLAN ACT

What's likely to be the final COVID-related stimulus bill, the \$1.9 trillion <u>American</u> <u>Rescue Plan Act</u>, was signed into law on March 11, 2021. That bill included \$168 billion in education-related funding, with a whopping \$126 billion for K-12 schools, \$40 billion for higher ed, and \$2.7 billion for the governors' discretionary fund.

Again, the funds for K-12 schools came with the same allocation requirements for Title I schools as the CARES Act. The Act requires school districts must spend at least 20% of the money addressing learning loss. Other eligible uses for the funds included purchasing technology for online learning and aiding in classroom instruction. As with the previous bill, school districts must use the funds they receive by September 30, 2023.

And continuing the rules associated with previous funding, universities must spend at



least the same amount on emergency financial aid grants for students as they did under the CARES Act on emergency financial aid. The remaining funds can be used for pandemic-related expenses, including the purchase of technology.

THE BOTTOM LINE

Securing education funding can be a daunting process, and state and local education authorities should work with their legislatures to determine the best course of action for securing the financing they need. If an institution lacks the technology they need to provide education in the new normal, now is the time to address those issues.

And while the amount of funding available for technology investments varies from state to state, between the three packages, there are billions of dollars available for schools to use for education technology. With deadlines for the use of funds rapidly approaching, there's little time to waste.

For more information on education funding available via the stimulus packages, organizations including the <u>National</u> <u>Conference of State Legislatures</u> and the <u>U.S</u> <u>Department of Education</u> offer various resources devoted to funding for schools.



With most educational institutions around the country having adopted some form of remote learning during the COVID-19 pandemic, the success of their efforts depended not only on how teachers delivered instruction but also on the technology used to deliver that instruction and engage and capture students. No matter how prepared and creative those teachers were in engaging students, their efforts were for naught without the proper technology.

The foundation of educational technology is audio. One of the main ways students learn is through hearing. As such, clear audio is the foundation to effective learning and essential to student achievement. The most popular audio solution in the classroom, no matter if it is in-person, hybrid or remote, is an integrated microphone system. For face-to-face instruction, a microphone system's primary use is to help amplify audio to all corners of the classroom so the speaker can be heard clearly. For hybrid and remote instruction, such a system ensures everything an instructor says can be recorded or broadcast to students in an equally clear manner. It can also be integral in capturing and sharing student participation in lessons to ensure a more lively and natural classroom experience.

And for students with hearing difficulties, a proper microphone and speaker system

25% OR MORE HAVE ACADEMIC DIFFICULTIES CO-EXISTING WITH MINIMAL HEARING LOSS.

allows them to increase audio volume without distortion. According to The Mainstream Amplification Resource Room Study (<u>the MARRS Project</u>), commissioned by the U.S. Department of Education, 25% or more of the current school population "have academic difficulties co-existing with minimal hearing loss (defined as 15-40 dB)." Without adequate audio, children can miss significant language experience and academic instruction, leading them to develop learning difficulties that may eventually require special education services.

Several studies have indicated that integrated classroom audio improves student's opportunities to learn. The MARRS Project concluded that there were multiple benefits when proper audio was added in classroom settings.

Some of the key benefits found were:

IMPROVED ATTENTION

An audio system can help enhance a speaker's pronunciation, tone, and inflection, enabling the students to better comprehend the information being delivered. According to the MARRS study, when students receive audible instruction clearly and with amplification, all commented that it helped them pay attention and better understand directions.

INCREASED CLASSROOM PARTICIPATION

If a student cannot hear or understand correctly, there is often a lack of confidence to participate in any discussion or ask for further explanation. With improved classroom audio and a better grasp of the concepts being discussed, the assurance brings forth more student contributions. Teachers report improved student attention, The MARRS project found, with fewer distractions and less need to repeat instructions.

BETTER CLASSROOM MANAGEMENT

Enhanced audio can cause less stress in the classroom and fewer discipline issues. With the help of a high-quality audio system, teachers can deliver lessons in their natural voice, and students no longer feel as though they are being yelled at. Discipline problems are reduced because the teacher can efficiently address every student in the classroom. For hybrid and remote classes, an easy-to-use audio system can reduce issues and latencies that can be caused by missed commentary or troubleshooting.

IMPROVED ACADEMIC SUCCESS

Sound field studies show that delivering a teacher's voice clearly and articulately results in a dramatic improvement in students' reading and language test scores at all elementary levels. The evidence for improved teaching and quality of instruction



is reflected in the statistically significant gains in reading and language achievement test scores for students included in classrooms using amplification or products with high-quality audio pickup (students with and without hearing loss). These improvements were evident after only one year of use, and the improved academic scores were maintained for as much as three years.

And when it comes to budgetary concerns, adopting an audio system for voice lift or audio capture for in-person, hybrid or remote classrooms was found to be more costeffective than providing supplementary resource room instruction. The MARRS study found fewer teachers required less supplementary resources to achieve the same or superior academic growth, lower initial and continuing educational costs, and a reduction in the personal cost to students who avoided the stigma, segregation, and restrictions of special placement.

On the other hand, students have to work much harder to understand someone when the sound quality is poor or choppy, and that effort takes up the brainpower that is needed for understanding and absorbing the message.



Sound plays an essential role in the education process. That role became significantly more important as schools moved classes online amid the COVID-19 pandemic and will remain a critical consideration in the future.

For educators, hosting classes in these new environments can be challenging without the right tools. If students are constantly in a state of confusion during class, either because they didn't hear what was said or because the audio has become garbled, the entire learning experience breaks down. The last thing a student wants is to be distracted or lose patience when a grade is on the line, and educators certainly don't want to feel as if they're speaking to the wind. If your institution is new to virtual or hybrid learning or is looking to enhance a current solution, we've outlined some tips to keep in mind.

SELECTING THE RIGHT AUDIO

The type, style, and configuration of audio systems naturally must be primary considerations in selecting equipment for remote lecture capture. How easy will they be to deploy or operate?

Also, when selecting a solution for virtual learning, ensuring compatibility with your systems is vital. Whether you want to add on to an existing system or are planning to switch in the future, a USB solution that is software agnostic enables your institution and lecturers the flexibility to switch from systems with little hassle.

Systems such as the <u>HD Single/Dual</u> offer compact and comfortable wearable microphone options great for live or prerecorded lectures. With rechargeable batteries and no wires or battery pack needed, this allows flexibility for teachers and facilitators to move about and engage naturally. With a trustworthy audio pickup, teachers can focus on the lecture and take the worry out of online lectures.

Yamaha UC's <u>YVC-1000</u> USB microphone and speaker system is the perfect solution for larger classrooms, with adaptive echo cancellation and human voice activity detection to minimize background noise and facilitate natural conversation. Automatic auto-tuning measures and analyzes the room environment, adjusting acoustic settings to the optimal level. The YVC-1000 also incorporates automatic warnings to alert to poor microphone placement.

Pro Tip: The HD Single/Dual can be combined with the YVC-1000 to capture both the teacher's audio and student commentary throughout the room for hybrid classrooms.

Another go-to solution for in-person and hybrid classrooms is Yamaha UC's <u>ADECIA</u> ceiling microphone and line array speaker solution. ADECIA auto-detects installed components, auto-configures the devices, and auto-optimizes audio performance for room audio environment, including reverberation characteristics, echo behavior, speaker/mic position, and more. The solution offers lecture capture and voice-lift, and is touchless for added safety. With the ability to add up to two microphones, it can be used to capture all participation in a variety of classroom sizes.



YVC-1000

REMOTE LEARNING

Speakerphones are an excellent option for teachers who need to host online classes. A portable speakerphone such as the <u>YVC-200</u> or <u>YVC-330</u> is a great option for more interactive settings. For personal use, we recommend the YVC-200 speakerphone. It has USB, Bluetooth, and NFC connections, with a 10-hour battery time. The device is small enough to set up anywhere for impromptu calls or as a staple in your home office. This portable speakerphone can also be a great addition to ensure a truly collaborative experience for student participation.



For those who may be hosting or joining from a house with others or at a shared working location, the YVC-330 is a great option for blocking out unwanted background noise. With similar functionality to the YVC-200, it includes a technology called SoundCap that eliminates background noise outside a onemeter range. This can be an excellent tool for ensuring the speaker's voice is picked up and clear for participating students.



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YVC-330

MICROPHONE TECHNIQUES FOR LECTURE CAPTURE

Once you've invested in a solid device, there are a few standard microphone techniques that can help your teachers capture better audio.

- Speak directly towards the microphone. Speaking away from the microphone can cause the sound to become quiet or muffled.
- As the inverse square law suggests keeping the microphone closer to your mouth will always provide better sound pickup.

When wearing a wearable microphone, be sure not to bump or drop it during the meeting. This amplified noise can be harsh when sent through to the far end, and the scratching of clothing against the microphone can cause scratching noises to overpower the content.



SOUND OUTPUT

We've focused a lot on microphone pickup for both teachers and students. However, another key element to always consider when it comes to in-person and hybrid classrooms is sound output. It is important that students in the room can not only hear the teacher (in a voice lift scenario), but also students that may be remote (in a hybrid setting).

In a voice lift set up, systems are designed so the listener who's farthest away from the speaker can hear as well as the closest person.

In a hybrid set up, it is important to create an engaging and realistic experience so that remote participants can be heard as if they were also in the room. Their commentary and participation is essential to the classroom.

Creating a consistent and comfortable noise level in the room can be achieved in many different ways. In the <u>ADECIA</u> solution, the use of POE+ line array speakers utilize technology to disperse sound evenly across the room using the 16 speaker elements.

For small to medium rooms, sound bars like the <u>ESB-1090</u> can be used to create powerful sound throughout the room. Incorporating 2 built-in subwoofers, dome tweeters, and full range speakers, classrooms can be filled with rich, high-quality sound.





ESB-1090 Sound Bar

ADECIA Tabletop



Of course, the true test of communication solutions is how well they perform in realworld situations. Here are a few examples of Yamaha UC products in educational settings:

HYBRID LESSON AT ITS BEST - CHUO UNIVERSITY BUSINESS SCHOOL

Amid a state-issued emergency due to COVID-19, <u>Chuo University Business School</u> still had to plan to welcome new students in 2020.

From July to September, with the cooperation of volunteer students, Chuo Business School conducted several experimental hybrid classes using existing equipment. Still, the sound quality of the speakerphones they were using was poor.

Just when the school was about to give up the idea of hybrid classes, a student who participated in the experimental class advised that his company had just implemented Yamaha's products, and the sound quality was very impressive. Chou Business School quickly decided to conduct the experimental hybrid class using a <u>YVC-</u> <u>1000</u> demo device.

A YVC-1000 and a webcam that showed the entire classroom were installed, and by connecting a handheld microphone for professors, the voice was clearly heard by the remote students. In addition, five extension microphones, YVC-MIC1000EX, were connected to the YVC-1000 and placed among students in the classroom to pick up and deliver classmates' voices to the remote side.

As a result, natural and lively communication occurred in the hybrid classes. The discussions became more effective, and the learning quality was elevated.

VIEW FULL CASE STUDY

COLLABORATIVE CLASSROOMS AT ORAL ROBERTS UNIVERSITY

At <u>Oral Roberts University (ORU)</u>, demand for open, collaborative spaces is increasing, along with a desire to create a hybrid environment where remote online students can participate in multiple, simultaneous breakout sessions with students in the local classroom.

The school first tried the computer's built-in microphone and speaker and when that failed, they bought in traditional desk speakerphones that are commonly used in offices. However, the speakerphone required manually dialing into the conference number and was inadequate in isolating the audio of simultaneous video conferencing sessions being conducted in their room.

ORU tested the <u>YVC-330</u> with Yamaha's SoundCap Technology that eliminates background noise. They found that YVC-330 effectively limited background noise for their sessions.

"The SoundCap technology filters out background noise and improves the listening experience for the remote users. Most remote users initially comment on the quality and intelligibility of the conversations. This is one of the best sounding solutions we have used. We are looking forward to using YVC-330s in our Collaborative Learning Lab to facilitate multiple, simultaneous Zoom video conference sessions at adjacent tables."

VIEW FULL CASE STUDY

WILLAMETTE UNIVERSITY ELIMINATES AUDIO FRUSTRATIONS FOR REMOTE LEARNERS

<u>Willamette University</u> prides itself on "being a community of collaborative educators committed to a rigorous education that cultivates an authentic engagement and promotes the transformation of knowledge into action in ways that lead to lives of achievement, contribution, and meaning."

The school responded to COVID-19 by reducing its classroom sizes, modifying facility layouts to maintain social distance, and expanding its remote learning program. All these efforts required a high reliance and creative use of technology, especially video conferencing supported by high-quality, flawless audio.

While video was provided with simple PTZ cameras, audio was provided by the Zoom-certified Yamaha <u>YVC-1000</u> Microphone and Speaker System.

The school deployed 36 units across several



new remote classrooms. Depending on the size of the room, each room was equipped with three, four, or five microphones. The speakerphone's scalable, easy-to-deploy architecture was perfect for turning the former event spaces and a 125-seat theater into a highquality hybrid classroom in under an hour.

VIEW FULL CASE STUDY

CAPTURING LECTURES AT UNIVERSITY OF TWENTE

Located in Enschede, Netherlands, the <u>University of Twente</u> is one of the world's most entrepreneurial schools. Unfortunately, that exceptional learning opportunity was being compromised by a poor audio experience in many of the school's classrooms. Students struggled to hear and understand lectures, a key source of class material.

Clear, intelligible sound was top priority to ensure students would hear and understand every word. With more than 90 lecture halls on campus, the solution needed to be reliable, easy to deploy, and easy for the staff to operate.

University of Twente selected the <u>HD Single and</u> <u>Dual</u> Channel Wireless Microphone System to resolve the school's audio issues.

"It's so simple to use that the staff can literally forget all about the audio. They trust the system to do its job and provide the best lecture experience for their students. Our investment in this system has also truly eased the burden on our support team. Within the first week of operation, we saw a significant decrease in the number of support calls from our professors."

VIEW FULL CASE STUDY



As teachers return to the classroom, they're finding themselves faced with a new normal. Although traditional face-to-face instruction will likely always play a role in education, remote learning and hybrid instruction will be just as important.

In addition, <u>teacher shortages</u> in school districts all around the country will likely mean larger class sizes. Finding new and innovative ways to engage with students is an ever-increasing challenge. Institutions of all types are using technology to help address that challenge, and audio is at the center of that technology.

Audio quality plays a critical role in facilitating communication with students – especially in today's unique environments. With education technology tools to enhance classroom audio, students have shown improved attention, increased classroom participation, fewer discipline issues, and improved academic success.

If there's a silver lining to the hardships we've faced because of the COVID-19 pandemic, it's that schools have the opportunity to remake the way they deliver instruction and incorporate the technology they need to set the stage for the future.

Still, all technology isn't created equal. Choosing the proper tools can enhance education, but working with a technology vendor without adequate experience can result in wasted dollars and a poor-quality learning experience.



Education technology has been an area of focus for Yamaha UC since the beginning. With more than 130 years in the audio business, Yamaha brings unique and innovative solutions to classroom audio whether it be in-person, hybrid, or remote learning.

DEAN'S LIST PROGRAM

Through Yamaha UC's <u>Dean's List program</u>, all U.S.-based K-12 schools, colleges, universities, and other qualified institutions will be able to experience Yamaha quality at reduced pricing.

Learn more about our program and associated discounts <u>here</u>.

