The Silver Lining of Distance Learning

Strategies Developed for Remote Teaching that can Transform In-Person Instruction

Independent Analysis Unit

Los Angeles Unified School District

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The views expressed herein are those of the Independent Analysis Unit and do not necessarily reflect those of the District, the Board of Education, or any individual Board Member.

EXECUTIVE SUMMARY

Though the downsides of distance learning have received great attention **since the COVID-19 pandemic forced school facilities to close in March 2020**, **many teachers appear to have found a silver lining in their use of educational technology to engage students and families in new ways**.

A survey conducted by the Independent Analysis Unit (IAU) found that, during remote teaching, many teachers discovered tools and techniques they believe benefited their students and that they plan to take back with them to the classroom. As one teacher put it, "The wealth of ideas and strategies we have collected over the past 10 months is an excellent box of tricks to keep at the ready for when we get back on campus.

L.A. Unified has a unique opportunity as it develops and modifies the 2021-2022 budget to leverage teachers' experiences with remote instruction to transform in-person teaching and learning by integrating educational technology.

Methods

We sent the survey questionnaire to an anonymous stratified random sample of 4,750 District teachers in January and February 2021. The questionnaire included one open-ended response item, which was a follow-up to a question about whether teachers had developed strategies for remote teaching that they planned to continue to use when in-person teaching resumed. Those who replied "yes" (82% of respondents, *n*=1,095) had the opportunity to describe these strategies. Many did so (almost 70% of total respondents, 911 of 1,331). An inductive qualitative coding process was followed to produce a qualitative analysis of results, presented here.

Findings

Online teaching during COVID-19 school facilities closures was fundamentally different from classroom instruction and depended on technology. However, many teachers found ways to transfer their new skills to their in-person classrooms. **Almost all respondents to the survey named specific educational software they had used for online instruction and that they planned to continue to use when classes resumed in person** (complete list on page X).

The application list offers insights into how teacher practice during remote learning may translate into educational technology integration. Schoology was by far the most mentioned, followed by Google Apps, Nearpod and Zoom. The use of tools differed by grade level. For example, GoNoodle and ClassDojo are for young children; Google Apps, Pear Deck, and Khan Academy are useful in secondary school, as are special-purpose applications like Labster for online science labs.

Teachers also described how they planned to integrate these tools into their teaching and, in some cases, the instructional challenges or situations to which they applied.

The techniques for teaching with technology ranged across the four tiers of educational technology integration laid out by the SAMR model—substitution, augmentation, modification, and redefinition.

- **Substitution and augmentation**: paper tests moved online, sometimes augmented with videos or animations; lectures became videos; textbooks were replaced by prepared materials in a variety of subjects.
- **Modification and redesign**: online discussions allowed all students to participate simultaneously; Schoology became the way teachers organized and collected assignments and managed communication between all

participants—including parents; and a few teachers found ways to personalize learning and give the students agency, such as when students made videos of themselves demonstrating what they had learned. In addition, teachers invented new activities and tasks; they redefined the traditional day, making flexible use of the schedule, communicating with students and their families after hours and allowing students to complete work in different ways.

Some of these techniques allowed for differentiation, increased student engagement, and inclusion. Many teachers also described how they had found technological solutions to partnering with students' families for academic success and providing social-emotional support.

Recommendations

As they prepare the District's budget, leaders of L.A. Unified have a once-in-several-generations opportunity to transform teaching, learning, and the home-school connection to accelerate lagged learning, close opportunity gaps and prepare students for the 21st Century economy.

Advocacy and continued support

The Board of Education and District leadership have already committed to several components of effective educational technology integration, and should remain committed to:

- Advocating for affordable high-speed internet access
- Providing and supporting the learning management system, (e.g. Schoology).
- Providing licenses or subscriptions to other educational software and services.

Allocating resources

Components of transformative educational technology integration include:

- 1:1 devices for all schools and all students, including hotspots as needed.
- Professional development for educational technology integration. The Division of Instruction has developed a model of job-embedded coaching and on-site professional development—the Practitioner School Model.
- Evaluation and continuous improvement.

Planning and strategically developing policies that support transformative practices

Learning acceleration requires more than IT infrastructure. For change, the Board should:

- Understand and support the *Digital Futures Guide*, which presents a comprehensive vision for L.A. Unified's digital future, including modernizing IT infrastructure, and promoting effective teaching and learning with technology.
- Encourage collaborative planning between ITD and the Division of Instruction, with instruction driving innovation.
- Ensure that schools develop instructional technology plans.
- Commit to strengthening the home-school connection by adopting a District-wide policy of increased teacher-parent and school-home communication using internet and communications technologies (e.g. Schoology, Remind)
- Explore the role internet and communications technologies can play in effective, trauma-informed, and culturally sensitive social-emotional support and learning.

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Since the COVID-19 pandemic forced school facilities to close in March 2020**, many teachers appear to have found a silver lining in their use of educational technology** to engage students and families in new ways.

A survey conducted by the Independent Analysis Unit (IAU) found that, during remote teaching, many **teachers discovered and learned how to use tools and techniques they believe benefited their students and that they plan to take back with them to the classroom**.[1] As one teacher put it, "The wealth of ideas and strategies we have collected over the past 10 months is an excellent box of tricks to keep at the ready for when we get back on campus."

In addition to gaining a "box of tricks," **teachers took from remote instruction fresh perspectives and appreciation of the potential benefits educational technology could offer**. Some teachers found the pace of instruction during remote learning to be conducive to lesson development and learning about their students. One elementary teacher reflected, "I have spent a great deal of time developing daily math assignments that the students are required to submit through Schoology…I'm actually getting a better idea of the concepts that they understand as well as their misconceptions. When we were in the classroom, we would review assignments without me actually looking at their work…I actually feel that I'm able to better support and understand my students' needs than when I'm in the classroom…"

Others reported organizational benefits: "I have…become more organized which will benefit my students moving forward." Some found that differentiation became easier: "The quick response to the crisis positively expanded differentiated instruction and learning practices as an outcome."

As the results from this survey show, teachers have developed skills and, by applying these skills to instructional challenges, they have seen benefits and developed a favorable disposition towards educational technology.

> "I actually feel that I'm able to better support and understand my students' needs"

Skills and awareness of benefits are two key conditions for any kind of organizational change. For transformative educational technology integration, technical infrastructure is also needed. To meet this need, **the District has provided 1:1 devices, internet connectivity, software, and professional development.** In short, many of the conditions are in place for successful learning acceleration through educational technology integration and **the current need for pedagogical practices that can accelerate learning is great.**

But favorable conditions for changed practice may not last. Infrastructure will age; teachers' skills will become outdated, and enthusiasm for change may fade. Moreover, billions of supplementary dollars currently available are well-suited to one-time expenditures that support educational technology and they are unlikely to materialize again.

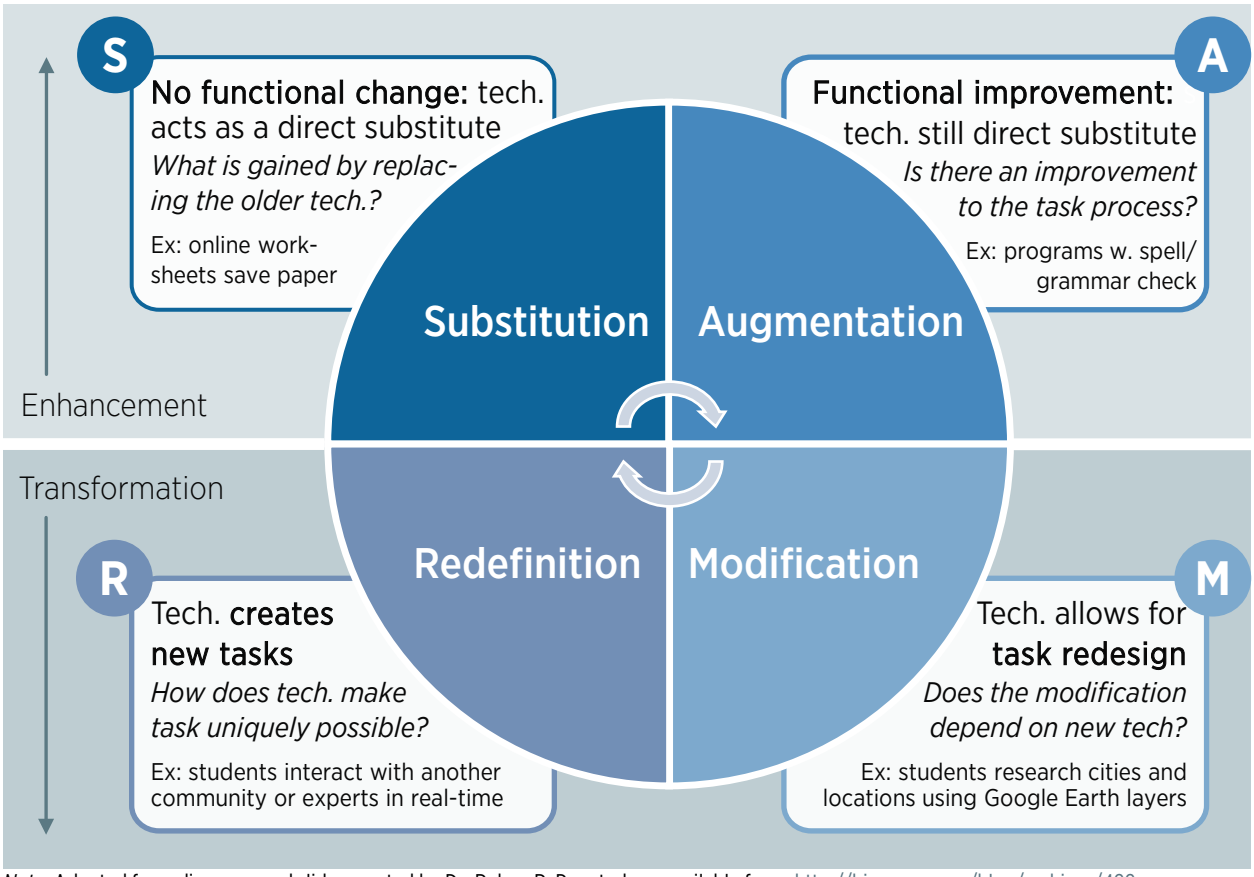
The opportunity is great and the need is urgent, but transferring practices developed for distance learning to classrooms in a way that transforms teaching and learning requires more. **The District must reinforce the change and encourage more integration by implementing strategic plans for educational technology integration and by monitoring and evaluating the implementation for continuous improvement**.

THE PROMISE OF EDTECH INTEGRATION

The purpose of the IAU Remote Learning Support Survey was to help "Board members understand and respond to the needs teachers and students might have when school facilities reopen." The questionnaire included one open-ended response item that gave teachers who had developed strategies for remote teaching that they planned to continue to use when in-person teaching resumed a chance to describe those strategies. Almost 70% of total respondents did so, which indicates that educational technology will be present in the classroom when schools fully reopen in the fall of 2021 and beyond. Yet the presence of educational technology in the classroom does not guarantee transformative benefits (*e.g.*, the "dynamic and inspiring learning experience" the District aims to provide to its students and that educational technology promises).

Educational technology improves teaching and learning when teachers change their instruction. The SAMR model[2] is one broadly used framework for evaluating educational technology integration that helps clarify the distinction between the tools teachers use, the techniques they develop with these tools, and the applications for these techniques that can afford transformative learning experiences for students. SAMR stands for "substitution, augmentation, modification, and redefinition" and has two tiers – with substitution and augmentation, educational

Figure 1. The SAMR Model Guide for EdTech Integration



Note: Adapted from diagrams and slides created by Dr. Ruben R. Puentedura, available from: http://hippasus.com/blog/archives/499v

technology enhances teaching and learning; modification and redefinition indicate educational technology has transformed teaching and learning. Figure 1 defines each level and provides questions and examples to distinguish between levels.

Historically, educational technology innovations have driven changes to instruction. To realize the promise of educational technology, however, greater attention should be paid to what changes in instruction are needed to transform teaching and learning to better serve students. The SAMR framework helps highlight the need to focus on instructional practices such as personalized and collaborative learning experiences that educational technology can afford. At the same time, the framework also helps illustrate how educational technology can perpetuate traditional teaching practices if teachers lack the support to integrate technology to redesign tasks students engage with in the classroom.

In this report, we discuss the results of a qualitative analysis of the responses to the open-ended question on the survey in terms of the SAMR framework. We then present recommendations. A complete presentation of results follows in the "Additional Materials" section.

TEACHER'S PLANS FOR EDTECH FOR THE FUTURE

Online teaching during COVID-19 school facilities closures was fundamentally different from classroom instruction and depended on technology. It forced teachers to substitute face-to-face activities with a variety of remote activities. Along the way, teachers modified tasks they had always assigned and invented new ways of doing things. From this experience, many teachers saw tools and techniques they could port to the traditional classroom, according to data from the IAU Remote Learning Support Survey.

Tools for teaching with technology

Almost all respondents to the survey named specific educational software they had used for online instruction and that they planned to continue to use when classes resumed in person (the complete list is presented in Appendix A, Table A1).[3]

The application list offers insights into how teacher practice during remote learning may translate into educational technology integration. Schoology was by far the most mentioned, followed by Google Apps, Nearpod

L.A. Unified has teams, policies, and strategies in place that can lead and inform transformative educational technology integration.

In May of 2018, the Board adopted Resolution 039-17/18 "Empowering Today's Learners for Tomorrow's Increasingly Digital World through Access and Equity of Digital Tools and Resources," which, among other things, resolved to work towards "eliminating the digital and participatory divide by increasing access to technology." Further, the Board committed to be "a national leader in education by increasing access to technology, [and] access to high-quality instruction that leverages technology." The remote-learning response to COVID-19 school facilities closures accelerated the District's fulfillment of these commitments, but the work done so far needs to be leveraged and sustained to achieve fully the goals of this resolution.

For this purpose, **a strategy already exists**. Developed in collaboration between District staff and the International Society for Technology in Education (ISTE), the *Digital Futures Guide* includes proposed pilot projects for schools and a plan to modernize IT infrastructure.

The Division of Instruction includes **a team of seasoned experts to guide this effort**: The Instructional Technology Initiative. This group has developed incentive programs for schools, templates for school technology plans, certification programs, and a model of in-school peer professional learning support called the Practitioner School Model.

and Zoom. All of these—except Nearpod—support a range of instructional or communications activities (e.g. creating and submitting documents or having discussion) that can be synchronous or asynchronous and can be used remotely or in-person. Nearpod offers pre-made, interactive lessons for all school levels and subjects. Many teachers used it extensively for distance learning and would like to continue using it in person. It includes a "front of class" mode for integrating into regular classroom activities.

The use of tools differed by grade level. For example, GoNoodle and ClassDojo are for young children; Google Apps, Pear Deck, and Khan Academy are useful in secondary school, as are special-purpose applications like Labster for online science labs. Going forward, educational technology integration will look different for different grade levels and subjects.

Because the District does not approve or support all of the tools teachers reported using, these resources are not necessarily recommended.

Techniques for teaching with technology

Teachers did not just list the software they planned to continue to use; they described how they planned to integrate these tools into their teaching and, in some cases, the instructional challenges or situations to which they applied.

The techniques for teaching with technology fell into several categories, shown in Table 1. (For more detail, see page 13) and they ranged across the four tiers of educational technology integration laid out by the SAMR model—substitution, augmentation, modification, and redefinition.

Schoology: L.A. Unified's Learning Management System

The backbone of remote instruction in any setting is the learning management system (LMS). An LMS is a software application for the administration, documentation, tracking, reporting, automation, and delivery of educational courses. The LMS in use in L.A. Unified is called Schoology.

Schoology provides a web-based virtual classroom environment for each class. On the course or grade-level web page, teachers post announcements, instructional materials such as handouts and videos, and provide instructions for assignments. They also create discussion forums, grade assignments, and send e-mail to students and families through the platform. Schoology is integrated with a host of other applications in wide use across the District including Zoom, Microsoft Office, Google Docs, YouTube, Khan Academy, and others. Students complete assignments via the Schoology site and teachers can provide feedback and grades directly on the site since Schoology is also integrated with the District's student information system. All activity can be tracked and monitored. Using these and other features, teachers can provide asynchronous and synchronous online education.

Prior to March 2020, many teachers, particularly in secondary schools, used Schoology asynchronously as a gradebook or communications platform. After school facilities were closed, many more, including many elementary school teachers, have adopted the platform and used its range of capabilities, including as the gateway to synchronous instruction—Zoom video conferencing, and real-time chats.

Schoology was mentioned 257 times by respondents to the Remote Learning Support Survey. Typical comments were that teachers planned to continue to use, "Schoology (to hold all resources and materials instead of physical paper)," or teachers planned to continue with, "100% Schoology implementation with resources and online work sub-mission." One secondary teacher summarized how they planned to continue the use of the platform for: "...grading (giving students/families complete/ongoing access to grades/comments), assessments (and re-takes), and communicating with students easily, assigning Google assignments from with-in Schoology platform. Schoology is also valuable for posting assignments, links, re-sources, schedules, and groups, etc."

Teachers found substitutes for activities they had conducted in their classrooms: paper tests moved online, sometimes augmented with videos, animations, or dynamic logic; lectures became videos; textbooks were replaced by prepared materials in a variety of subjects. All of this can continue in person.

Teachers also found ways to significantly redesign existing tasks using technology and they are interested in using the modified tasks in their classrooms. During distance learning, online discussions allowed all students to participate simultaneously; Schoology took over as a way to organize assignments and manage communication between all participants—including parents. And a few teachers found ways to personalize learning and give the students agency as when students made videos of themselves demonstrating what they had learned, which is a task some teachers plan to continue to assign.

Table 1. Techniques for Teaching with Technology as Mentioned by Teachers Surveyed

Technique	Description
Videos	Teacher-recorded lessons, student-recorded videos/presentations as formative assessments, and assigned instructional videos for students to watch on YouTube and elsewhere. *Platforms mentioned included Schoology, EdPuzzle, Flipgrid and Kapwing.*
Online Resources	Engaging content to supplement learning or alternatives to hands-on learning experiences. *Some of the platforms mentioned included EdPuzzle, PBS learning, BrainPop, and Discovery Ed.* **Good for differentiation.**
Online Assessments and Assignments	Student self-assessments, formative assessments, and summative assessments, in addition to collect/ transforming daily work and assignments from paper to digital formats. *Platforms mentioned included Schoology, Nearpod, IXL, and Google Sheets.* **Good for data-driven instruction.**
Online Group Activities	Facilitate group work inside the classroom and meeting outside classroom time (e.g., group projects). *Platforms mentioned included Zoom, Eureka, Nearpod, and Khan Academy.* **Good for differentiation and increased engagement.**
Online Discussions	Student responses to teacher prompts followed by student-to-student comments, in addition to chat features during lectures, digital participation boards, and informal checks for understanding. *Platforms mentions included Schoology, Nearpod, and Jamboard.* **Good for increased engagement.**
Independent Work	Online-facilitated lessons to be completed by students at their own pace **Good for differentiation and accelerated learning.**
Surveys/Polls	Used for student-to-teacher feedback, checks for understanding, and social-emotional check-ins **Good for data-driven instruction.**
Flipped Classrooms	Video lectures and content materials replace homework so that class time can be used for independent practice and group work **Good for differentiation and accelerated learning**
Online Tutoring	Online instruction via Zoom outside of class-time or after school
Online Games	Engage students in games or "gamified" quizzes to keep students engaged, reinforce learning or practice new skills **Good for increased engagement**
Online Labs	Virtual labs for science instruction and teacher-created station labs for all content areas. *Platforms mentioned include Discovery Ed and Labster Labs.*
E-Portfolios	Alternative assessment that encompass student assembled materials that demonstrate their proficiency in the material. *Platforms mentioned include Schoology, Google Classroom, and Seesaw*

Note: In order from most to least mentioned. Appendix B, Techniques for Teaching with Technology Discussion, elaborates on each technique.

In addition, teachers invented new activities and tasks using technology and they plan to try to continue these activities. They redefined the traditional day, making flexible use of the schedule, communicating with students and their families after hours, and creating opportunities for students to do their work in different ways throughout the day.

Teachers wrote about how some of these techniques allowed for differentiation, increased student engagement, and inclusion: "I have discovered many new and engaging websites that will allow for differentiation and independent work in the classroom." As one teacher put it, online tools allowed, "for more indirect methods of participation in class [which] has allowed some more introverted students to participate whereas normally they might not have shared at all."

The real power of educational technology arises when teachers apply new techniques to difficult challenges. In their responses to the survey, in the context of remote teaching during the COVID-19 pandemic, teachers frequently mentioned technological solutions they had found to two challenges: partnering with students' families for academic success and providing social-emotional support.

Application: strengthened home-school connection

Prior to the period of involuntary remote instruction, teachers typically communicated with families only periodically and sometimes with difficulty. Though this level of home-school connection is adequate in some cases, educators have long acknowledged that closer ties between families and schools are important for academic achievement.[4] Distance learning, while at first seeming to exacerbate the problem, brought school-home communication to a new level: electronic communication through various modes occurred daily, replacing in-person interaction.

This shift from mainly in-person communication to exclusively remote interaction between teachers and students at home may have at least partially broken down barriers between school and home, opening new possibilities.

Frequent electronic communication facilitated more productive interaction with parents. As one elementary teacher put it: "...there have been a lot of great opportunities to involve parents at home with projects using Seesaw. This has increased the home-school connection and parents' involvement in their child's schoolwork." In the process, many teachers may have realized how parents could be allies in the effort to engage students.

Application: Social-emotional learning and support

A second challenge that many teachers have faced is how to support the social-emotional needs of their students. The pandemic accentuated students' needs and highlighted the importance of social-emotional learning (SEL). Not only were students missing out on the socialization that schools help provide, but also the pandemic itself adversely affected many families' health and finances.

Teachers' comments to the open-ended survey question reflected a heightened concern with students' social-emotional well-being and a desire to continue to support students' SEL needs. A major technique for supporting students' SEL needs is the daily check-in, which was mentioned by many teachers. Often, they checked in via Seesaw or other instructional technology tools.

The recognition of the importance of social-

emotional wellbeing indicates that many teachers are aware of a need and use a new technology to meet it. This recognition and new skill are the first steps towards organizational change. However, the data from this survey are not adequate to show whether teachers have been providing the quality of social-emotional support that is needed. This is an area where strategic planning, implementation, monitoring, and evaluation are key to success.

> "Education as we know it has changed and we must take the lead and evolve with it."

RECOMMENDATIONS

As they prepare the District's budget, leaders of L.A. Unified have a once-in-several-generations opportunity to transform teaching, learning, and the home-school connection to accelerate lagged learning, close opportunity gaps and prepare students for the 21st Century economy. Data from this study show that many teachers have developed needed skills and see the benefits of educational technology integration. We also know that the District has put much of the needed technical infrastructure in place, including preliminary plans and professional development opportunities. All these conditions are necessary, but not sufficient, for transformation. **The District also needs to reinforce the progress they have made to make the changes stick.**

Current favorable conditions may not last. The infrastructure the District has put in place will age; teachers' skills will atrophy, and desire and enthusiasm for change may fade as schools return to business as usual. Moreover, **billions of supplementary dollars currently available are suited to one-time expenditures that support educational technology** and they are unlikely to materialize again.

Therefore, **the District should act now to maintain and expand transformative educational technology integration**. Taking advantage of this extraordinary opportunity will require providing continued support, allocating key resources, and, most importantly, a strategy.

Advocacy and continued support

The Board of Education and District leadership have already committed to several components of effective educational technology integration, and should remain committed to continue:

- Advocating for **affordable high-speed internet access**[5]
- Providing and supporting the **learning management system**, (e.g. Schoology). $100 million is proposed in the Path to Recovery for software development and digital content, but how this relates to the system's backbone, the LMS, is unclear.
- **Providing licenses or subscriptions to other educational software and services.**[6] The $100 million in the Path to Recovery Proposal also applies to software purchases.

Allocating resources

Some components of successful implementation of a transformative educational technology integration are in place and should be maintained and strengthened or given additional funding, and some are not yet in place. The Board should:

- **Ensure that resources continue to be allocated for 1:1 devices for all schools**

and all students, including hotspots as needed.[7] The Path to Recovery budget proposal contains $73 million for devices and hotspots.

- In addition to allocating IT resources for equipment and technical support, **it is critical that teachers get the support they need for improving their instructional practices. The Board should ensure that adequate resources are allocated to professional development for educational technology integration.** The Division of Instruction has developed a model of job-embedded coaching and on-site professional development—the Practitioner School Model. It is unclear whether this program is included in the Path to Recovery.
- Provide resources to **monitor and evaluate the success of expanded educational technology integration.** An independent outside evaluation might be about $1 million, or this work could be assigned to the new strategic evaluation branch.

Plan strategically for effective educational technology integration and develop policies that support transformative practices

The District cannot expect learning acceleration through educational technology integration if it invests in hardware, software, and infrastructure, but neglects a strategic plan for how to sustain and expand teacher capacity for change. The Board should:

- **Understand and support the *Digital Futures Guide*,** which was developed with the cooperation of District officials and presents a comprehensive vision for L.A. Unified's digital future, including modernizing IT infrastructure, promoting effective teaching and learning with technology through the Practitioner School model.
- Encourage collaborative planning between the Information Technology Division and the Division of Instruction. In L.A. Unified, instructional needs should drive IT decisions.
- **Ensure that schools develop instructional technology plans.** These plans would describe how schools will transfer the skills and practices developed during school facilities closures to in-person teaching and be integrated with schools' Single Plans for Student Achievement.
- **Commit to strengthening the home-school connection** by adopting a District-wide policy of classroom openness and increased teacher-parent and school-home communication using internet and communications technologies (e.g. Schoology, Remind and similar tools).
- **Explore the role internet and communications technologies can play in effective, trauma-informed, and culturally sensitive social-emotional support and learning**.

The Path to Recovery Budget Plan and Educational Technology Integration

Although the Path to Recovery includes funding that relates to educational technology integration, it does not explicitly leverage teachers' skills and experiences during school facilities closures. The Path to Recovery includes, in the "acceleration of learning" category $310M for:

- $72M for teacher technology kits, classroom camera systems, and accessories
- $38M for student devices, tech. kits, and accessories
- $35M for hotspots
- $100M for software development and digital content
- $15M for an Assessment management system (AMS) that works with Schoology
- $30M for an online program
- $20M for expanded instructional tech. positions

ABOUT THE STUDY

In January and February 2021, the Independent Analysis Unit (IAU) administered the *Remote Learning Support Survey* to a representative sample of District teachers.[8] The purposes of the survey were to understand teachers' experiences during remote instruction and identify some of the supports teachers and students may have needed as the District reopened schools for in-person learning.

The questionnaire included 30 multiple-choice questions and one open-ended response item. The latter was a follow-up to a question about whether teachers had developed strategies for remote teaching that they planned to continue to use when in-person teaching resumed.[9] Those who replied "yes" (82% of respondents, *n*=1,095) had the opportunity to describe these strategies. Many did so (almost 70% of total respondents, 911 of 1,331). This report presents these results.

Characteristics of the sample

The IAU Remote Learning Support Survey was a cross-sectional survey designed to capture the impressions, memories, and opinions of teachers about important issues facing them and their students during remote instruction. As such, all responses about the fall 2020 semester should be viewed as representative of teacher perceptions and plans at a point in time (early spring 2021), and not as depictions of actual teacher practices after schools reopened.

Respondents tended to have quite a few years of teaching experience: 40% reported having taught more than 20 years, 30% reported between 10-20 years of experience and about 30% said they had been teaching 10 years or less. Additional details about who responded to the survey are included in "IAU Report 2021 0521—Remote Learning Support Survey[10]."

How the analysis was conducted

This report details the results of a generic qualitative analysis that categorizes the responses to the open-ended survey item and presents key themes that emerged from this analysis. As such, the report cannot provide quantitative information such as the most common or most intense uses of educational technology. Instead, it provides insight into teachers' experiences of distance learning in their own words, which is useful for providing a nuanced view of a complex situation—teaching during COVID-related school facilities closures. In reading this report, it is important to remember that it is limited to one open-ended question on a single survey; it provides only a partial view of how teachers adapted their pedagogy.

To conduct the analysis, all open-ended responses were loaded into qualitative analysis software (nVivo) and inductively coded. We used an iterative process that began with initial coding that centered on software applications and remote instructional practices. We followed this initial coding with line-by-line coding, and categorization into 111 sub-categories that, after further rounds of coding, were combined into 11 primary categories (e.g. the *techniques* major category was a combination of the *video* and other subcategories. Contained within the video category more sub-sub-categories such as *video lessons*, *video assignments,* and *YouTube videos*.) From these categories, themes emerged such as the benefits of remote teaching, the relationship between remote-teaching practices and the ISTE standards, the home-school connection, and social-emotional learning.

NOTES

[1] As part of our Remote Learning Support Survey, the Independent Analysis Unit (IAU) of the Los Angeles Unified Board of Education asked a representative sample of teachers whether they had developed strategies for remote teaching that they planned to continue to use when in-person teaching resumed. Eighty-two percent of respondents (*n*=1,095) replied "yes." These teachers then had the opportunity to describe the strategies they planned to continue to use. Many did so, providing us with rich information about their experiences with distance learning during the pandemic and how they planned to carry lessons learned into the future.

[2] Puentedura, R. R. (2013, May 29). SAMR: Moving from enhancement to transformation [Web blog post]. Retrieved from http://www.hippasus.com/rrpweblog/archives/000095.html

[3] Teachers reported using applications and websites during school facilities closures, but not all these resources are approved for use or supported by the District due to concerns about student privacy. For more information about District-approved resources, see https://achieve.lausd.net/Page/16139

[4] Epstein, J. L. (2018). School, family, and community partnerships: Preparing educators and improving schools. Routledge.; Henderson, A. T., Averett, A., Donnelly, D., Jordan, C., Orozco, E., Buttram, J., ... & Wood, L. (2002). *A new wave of evidence: The impact of school, family, and community connections on student achievement.* Austin, TX: National Center for Family & Community Connections with Schools.

[5] In Resolution 020-20/21 "Closing the Digital Divide to Improve Distance & Hybrid Learning," the Board recently asked the superintendent to develop an action plan to "jointly fund connectivity for all children... to ensure every District student has access to the high-quality internet necessary for robust, uninterrupted participation in remote and/or hybrid learning..." The Board should revisit this resolution in 2022 to monitor progress.

[6] In the wake of remote learning, the District is in a good position to evaluate software and select the applications it would like to support. The IAU suggests that decision makers within the Division of Instruction make their selections based on proven effectiveness, teacher preference, and instructional priorities (e.g. literacy and numeracy tools related to Primary Promise).

[7] The District should continue its COVID-era provision of laptops, Chromebooks, or tablets to all students. Only then can teachers carry out many of the instructional strategies they say they would like to continue. Students should have devices available to them at home and in the classroom. As one teacher put it, "Assuming that the students are able to continue to have one on one devices at home I will be able to run a flipped classroom."

[8] The IAU sent an electronic questionnaire to 4,750 L.A. Unified teachers on January 22. Responses were accepted through February 23. To try to capture representative experiences and perceptions of different groups of teachers, the IAU randomly selected respondents from five sub-populations: early childhood, elementary, secondary, special education, and adult education teachers. Each of these sub-populations is adequately represented in the responses sample, except special education teachers.

[9] These items were derived from items CRS_T_CLO_887_S and 887_S_01 of the RAND Corporation's "2020 COVID-19 Distance Learning Survey." RAND used this questionnaire to survey the American Educator Panels in 2020. RAND American Educator Panels, American Teacher Panel, "2020 COVID-19 Distance Learning Survey", survey questionnaire, RAND Corporation, Santa Monica, CA, April 2020.

[10] http://laschoolboard.org/sites/default/files/IAU%20Report%202021%200521%20-%20Remote%20Learning%20Support%20Survey.pdf

Additional Materials

APPENDIX A: DESCRIPTION OF TOOLS

Table A1. Tools for Teaching with Technology

Application	Description
Schoology	The District's Learning Management System. Schoology is a virtual learning environment and social networking service for K-12 schools that allows users to create, manage, and share academic content.
Google & G Suite	Productivity applications including word processing and spreadsheets, document sharing and reviewing, meeting space with video.
Nearpod	A host of pre-made, fully interactive lessons developed by subject matter experts for all school levels and subjects. Allows teachers to import lessons from any file type and begin adding interactive elements, web-links or video snippets to them.
Zoom	Video conferencing software with built-in chat feature and breakout rooms that allows up to 1,000 concurrent participants.
Seesaw	Allows educators to synchronize their prepared lessons to all students' devices, casting the lessons simultaneously to each student, and to monitor students' progress throughout the lesson.
ClassDojo	A platform for teachers, students and parents is intended to foster positive student behaviors and classroom culture. Teachers take attendance, create random groupings, post instructions, display Think Pair Share questions and communicate with parents. Students access assignments and activities and submit work in written, visual, and audio format.
IXL	Comprehensive K-12 subscription-based skills review and quiz site, with analytics and other features. Good for self-paced or personalized learning.
EdPuzzle	Allows teachers to easily customize a video by adding questions and audio throughout the video.
Flipgrid	Teachers post discussion topics to which students respond via video, creating a social learning environment that provides every student an equal voice and increases engagement.
Padlet	Like paper for your screen. Start with an empty page and then put anything you like on it. Upload a video, record an interview, snap a selfie, add text or upload some documents, and watch your padlet come to life. Invite as many people as you like and watch the page update in real time with the contributions of others. Used by teachers, students, professionals, and individuals of all ages.
Remind	A communication platform that helps educators reach students and parents. Messages are sent in real time to an entire class, a small group, or just a single person. You can also schedule announcements ahead of time and attach photos and other files.
Pear Deck	Interactive activities and quizzes. Educators using Google Apps for Education or Microsoft Office 365 apps like PowerPoint Online and Teams can easily add formative assessments and interactive questions to their classroom experience with Pear Deck.
Jamboard	Digital interactive whiteboard developed by Google to work with Google Workspace, formerly known as G Suite.
Kami	Provides educators and students tools to view and edit documents and PDF files.
Kahoot	Allows teachers to quickly create fun learning games for students based around multiple choice questions. After creating the game, students can use any device to sign-in to the game 'room' using a unique code to complete lessons and compete against their peers.
Benchmark	Interactive and digital ELA resources.
Amplify Reading	A supplemental reading curriculum for grades K-5.
Blackboard	Robocall software and service tailored to school districts.
Desmos	Offers calculators, digital math activities, and curriculum.
PowerPoint	Popular and ubiquitous presentation software that is part of Microsoft Office software.

Application	Description
SKIES	A digital pinboard for planning and delivering lessons. Teachers and students interact by adding text and media-rich cards to each other's contributions. SKIES works well with partner, small group, and whole-class discussions.
Brainpop	A group of educational websites with over 1,000 short animated movies for students in grades K-12 (ages 6 to 17), together with quizzes and related materials, covering the subjects of science, social studies, English, math, engineering and technology, health, and arts and music.
Epic	Digital reading platform.
NewsELA	Takes real and new content from trusted providers and turns it into learning materials that meet most State standards.
Soundtrap	Provides a simple and quick way to record and develop music ideas collaboratively on mobile.
Raz Kids	Delivers hundreds of interactive, leveled eBooks spanning 29 levels that students can listen to, read, and even record themselves reading.
Khan Academy	Website that offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace. Includes lessons in math, science, computing, history, art history, economics, and more, including K-14 and test preparation (SAT, Praxis) content.
STMath	Math curriculum materials for multiple grade levels.
PBS Learning	Public broadcasting service that has curated and assembled online free, standards-aligned videos, interactives, and lesson plans for California teachers.
Clever	Single sign on; automatic rostering and platform for other learning applications.
Quizlet	Offers tools for students to make flashcards, practice spelling, play learning games, test their knowledge, collaborate with other students and more, providing engaging, customizable activities with contributions from people everywhere.
Sora	Reading application connected to libraries for eBooks and audio books.
Quizizz	Gamified quizzes, lessons, presentations, and flashcards for students
Mind Up	SEL application. Gives children the knowledge and tools they need to manage stress, regulate emotions, and face the challenges of the 21st century with optimism, resilience and compassion.
Boom Learning cards	A platform that allows teachers to create interactive lessons called Boom Cards.
Labster	Interactive advanced lab simulations based on mathematical algorithms that support open-ended investigations. Labs are combined with gamification elements such as an immersive 3D universe, storytelling and a scoring system.
Smartmusic	Music learning software for practicing and tracking progress.
GoNoodle	A series of web-based videos, games, and activities focused on introducing short bursts of physical exercise in the classroom for young children.
Delta Math	An online resource which allows students to practice problems covering topics from middle school, Algebra 1, Geometry, Algebra 2, Pre-Cal, Calculus, and computer science.
Interactive notebook	Non-digital interactive notebooks are spiral or composition notebooks where students can organize their notes. Students often glue notes sheets, foldables, timelines, vocabulary flaps and more into their interactive notebooks. Google classroom facilitates digital interactive notebooks.
Generation Genius	Online science videos and lessons for K-8.
EdHelper	Free worksheets and math printables.
Digital manipulatives	Manipulatives are physical objects that are used as teaching tools to engage. Many manipulatives are available in digital or virtual form from sources such as the National Library of Virtual Manipulatives.
Kapwing	An online image, video, and GIF editing platform.

Note: In order from most to least mentioned. This list represents applications and websites that teachers reported having used during school facilities closures. L.A. Unified does not necessarily provide, support, approve or sanction these applications and websites. For more information about District-approved resources, see https://achieve.lausd.net/Page/16139

APPENDIX B: ADDITIONAL DATA AND DISCUSSIONS

Techniques for Teaching with Technology

Videos. The most common technique that teachers wanted to continue besides simply using the Schoology LMS was the use of videos. Teachers recorded themselves teaching lessons, asked their students to make videos to share with the class and assigned students instructional videos on YouTube and elsewhere to watch. Teacher found creative ways to integrate short videos into instruction. One secondary teacher reported, "I have discovered that a good formative assessment is to require audio or audio-visual presentations in which students either re-tell learning or expand on material presented during online sessions." Applications that allow teachers to work with videos include EdPuzzle, Flipgrid, and Kapwing.

Online resources. Teachers have discovered the world of online instructional resources and plan to continue to take advantage. "I have located a number of resources that are engaging & will continue to utilize them as supplemental to learning or alternative to hands on learning experiences." Or, from an elementary school teacher: "I have learned to use websites to enhance learning. I use Edpuzzle, Generation Genius, PBS learning, BrainPop, Edhelper and many more that I will continue using." Another elementary teacher said, "Some of the online materials are excellent, and helpful resources for my students' various learning levels and abilities. I utilize music, YouTube videos, reading and science resources that are just incredible. The resources available on devices are wonderful once you learn how to use them."

Many online resources are available to teachers free-of-charge. But others require subscriptions or license fees. One teacher raised the issue of the District continuing to pay for licenses: "Using great resources and apps that I hope the district will continue to support us teachers w/ district licenses such as Discovery Ed, Learning A-Z/Raz Kids, Brain Pop & STMath/Jiji Math. In such a large district it is crazy that schools had to purchase them indiv. in the past. District licenses make the most since [sic] so that innovative teachers that teach sped / gifted and ELL students can support all students through the use of safe videos and learning apps."

Online assessments. Many teachers have also discovered the ease and utility of online assessments. They plan to continue, "Online assessments made through Schoology" or to "administer assessment digitally." Other platforms mentioned for assessment were Nearpod, IXL and Google sheets.

Online assessments can take various forms. One is self-assessments: "Using Schoology tests/assessments for immediate feedback." Another is the related idea of a formative assessment, which implies low stakes, with the purpose of allowing students to gauge their own academic progress. These assessments can be informal, as in: "using a 'status of the class' google spreadsheet to ask students to give a quick informal self-assessment and a discreet way to ask for assistance." But some teachers indicated they would use online tools for summative assessment as well, as in, "More tests given through schoology," or "I plan on keeping all assignments and assessments online."

Some teachers emphasized some of the unique advantages of online assessments: easy re-takes, and automatic grading: "I loved using Edpuzzles and the assessments option in LMS. This allowed for a lot of automatic grading that freed me up to plan."

Alternative assessments and the idea of giving students choices in their assessments also appeared in the data. Some teachers appear to have embraced how technology can make it easier to differentiate for different ability levels by providing students with choices regarding assessment. One teacher put it this way: "alternative assessments (projects, student choice assessments to demonstrate learning)." A related concept is authentic assessments and e-portfolios, which appeared a few times in the responses.

Collect student work/assignments or use less paper. An obvious advantage of online education—which quite a few respondents noted—is that it means less paper and less photocopying: "I will be much more likely to use digital resources than paper. It's easier for me to grade/provide feedback on students' work, plus there are no copies to make, which saves time and is more eco-friendly." Many teachers made similar comments: "More tech less paper," "Submitting assignments through Schoology," "Different modes for turning in assignments."

Online group activities. Class during COVID meant group meetings on the computer screen, most commonly through Zoom. Though the disadvantages of this mode of interaction are well known (e.g. difficulty of engaging with students who turn their cameras off, lack of non-verbal cues), quite a few teachers plan to continue to use online tools to facilitate group activities: "Students will be doing asynchronous group activities," and "Virtual collaboration."

Group activities can occur outside of class time (e.g. "I also plan on encouraging students to use Zoom to work on group projects outside of class hours.") or during class. Teachers plan on, "Engaging students in online group activities, like Kahoot, Google docs (individual and group work), NearPod so that there is nearly instantaneous sharing by many." Teachers also had ideas about how to continue to use Zoom to bring small groups together in the classroom. One teacher listed several: "small group leveled reading sessions (Zoom); small group writer's lab (Zoom); small group math intervention (Eureka)." The idea may be for some students to work with their laptops open in the classroom, but in collaboration with others in the same room, while the teacher works face-to-face with another group: "...Continue to assign online small group lessons using Nearpod, BrainPop, Khan Academy and Math Antics, while working directly with students who need intensive skill development."

Online discussions. Asynchronous discussions are core features of LMSs and online learning. In these discussions, teachers post prompts, every student is required to post a response, and everyone comments everyone else's posts. Teachers have seen how this kind of interaction between students is of value: "I will continue to use the discussion feature on Schoology for online peer discussions," and, "I see a lot of value in the Schoology platform tools (Discussions, uploading links, Quizzes, etc) and could see myself using them in tandem to in-class teaching."

Online discussions can also take place in class. Just as the chat feature in Zoom is useful during video conferencing, students could post questions to chats during class while the teacher presents lessons. One teacher called out: "digital participation boards to promote increased engagement."

An elementary teacher wants to use, "Jamboard for whole group discussions [during class]." Another teacher noted that online tools allowed, "for more indirect methods of participation in class [which] has allowed some more introverted students to participate whereas normally they might not have shared at all." Similarly, "I plan on still using Nearpod because some of the features on there help foster more participation from students who may be too shy or reluctant to speak out loud."

A particular technique that appeared several times in the comments was the "waterfall," which entails the teacher posing a question, students typing their answer in the chat, but only submitting when the teacher prompts everyone to hit enter at the same time, resulting in a cascade of student answers in the chat. "I'll continue to use the Waterfall strategy (kudos to whoever came up with that. It's simple but amazing!)" Or: "I really like the activities where students do a waterfall and respond at the same time on Zoom."

Independent work. During distance learning, the proportion of independent work increased, and some teachers want to encourage their students to continue working independently. Both elementary and secondary teachers reported wanting to continue, "Online lessons students can complete independently." One teacher said, "I plan to have the students do much more individual work than I did before." One reason for more independent work is its association with differentiation: "I have discovered many new and engaging websites that will allow for differentiation and independent work in the classroom." And: "[I plan to continue] assigning individual work to meet individual needs." One teacher explained a somewhat different the rationale, seeming to value independence in its own right: "I also will try to foster more independent learning so my students feel comfortable and know how to trouble shoot or handle incidents when they arise."

Interactive learning. Interactivity has long been a buzzword in educational technology and the term was mentioned frequently in teacher responses to the survey question, but it may have meant different things to different teachers. In general, interactivity refers to features of software that teachers think are effective for engaging students. For example: "The new strategies I've been using are related to the increased number of digital platforms to deliver the curriculum: Edgenuity, Nearpod, Listenwise, etc. These interactive platforms provide opportunities for students to be more engaged with the curriculum." One way they engage students is, "...In my opinion, these apps with an immediate reward system, are valuable." One early education teacher mentioned the value of interactivity for the youngest students: "Interactive activities are extremely beneficial to preschoolers as the activities ascertain their focus maintenance and the informal assessment tools that I regularly implement."

Surveys/polls. Quite a few teachers made use of polls in Google or Schoology and planned to continue "providing feedback to teacher through surveys," the "...use of survey data to inform instruction," to "give student surveys on what I could do to support their learning," or to "check for understanding through the use of exit tickets online and polls." Polls can also be used to ask, "how the students are feeling," or, "setting the day's intention, mindfulness."

Flipped classrooms. One use of internet and communications technology that educational technology advocates promoted long before the COVID pandemic was the idea of the "flipped" classroom. In such a class, rather than using class time for direct instruction and lectures, teachers allow students practice and work time, where they can work together on assignments with their teachers

and classmates on hand to provide support. After school, instead of homework, students watch video lectures, or otherwise study content materials. After teaching online for a year, some teachers planned to use the "flipped classroom with video lectures and in-person practice" going forward. One such teacher was aware that this plan was contingent on continued technical support from the District: "Assuming that the students are able to continue to have one on one devices at home I will be able to run a flipped classroom." Another teacher described one of the core benefits of video lectures that makes flipped instruction powerful: "...the idea of...providing videos for flipped classroom or giving students access to videos that they can re-visit in order to better comprehend the material." Additionally, teachers realized that the flipped classroom or some version of hybrid (i.e. online mixed with in-person) is valuable for differentiation: "I would like to practice flipped classroom techniques and split the class into online learning in class or class participation as a group to meet the different needs of students."

Online tutoring. Online instruction can also continue in tandem with in-person teaching for the purpose of tutoring, which will be needed to help students recover learning opportunities. Several teachers commented on their plans for tutoring: "I will continue to be available to all students and parents that request my assistance - for free tutoring," and, "I would like to continue my tutoring sessions via Zoom or in person."

Online games. Some teachers found "game-based learning" engaged their students and they planned "more gameification of instruction." One teacher said, "I can also use some tutorials and online games and quizzes to make the reinforcement of concepts more fun." Another: "I will continue to use my online games to help in aiding students to practice their skills.

Online labs. A small number of secondary science teachers mentioned tools that allowed them to offer virtual labs, which is an important, but expensive aspect of science instruction: "I plan to use some of the engaging labs and tools, like Discovery that are available online through Schoology." Some teachers apparently developed their own labs by combining tools: "Station labs that have been adapted for virtual learning by creating google slides that students may manipulate and complete tasks in a manner that combines different modalities such as videos, readings, measuring, visually assessing data and labeling/categorizing science examples that correspond to important vocabulary terms, and clozed reading as well as multiple choice question short checks for understanding." But there are also software applications, such as Labster, that focus on these kinds of activities: "...I am hoping that the district will continue to purchase the Labster Labs."

E-portfolios. Portfolios are notebooks of materials that students assemble to demonstrate their academic proficiency. Teachers at every grade level use this technique as a form of alternative assessment. Pedagogical specialists consider portfolios a form of "authentic" assessment. Some teachers found that online instruction fit neatly into digital portfolio development: "Students have gotten into documenting their work more, so I have digital records of it and we can also incorporate it into a portfolio more easily." Others use specific software designed to facilitate portfolios, such as Seesaw: "I plan to continue using the Seesaw digital portfolio for students to show their work and keep evidence of learning together. I will use it with families to show growth throughout the school year, and to facilitate conversations during parent teacher conferences," or, "Bulb digital portfolio platform," or they simply utilize the LMS and other multi-purpose tools for this purpose:

"using Schoology & Google Classroom as a portfolio for parent conferences and student reflection)."

Home-to-school connection

Increased communication was a major theme in many of the comments from teachers—either between teachers, with parents and families, with students, or between students. Prior to the period of involuntary remote instruction, teachers typically communicated with families on a periodic basis: through parent-teacher conferences, back-to-school nights, or through the occasional call home if an issue with a student arose. Traditionally, teachers and principals also put notes for parents in backpacks or, in the last decade or so, increasingly used electronic communications such as e-mails, texts, Blackboard Connect (i.e. robocalls) or features of electronic gradebook software to provide parents with information about what students were doing in school.

Distance learning, however, brought school-home communication to a new level: electronic communication through various modes occurred daily and was the primary communication that occurred between and among all school participants. This shift from mainly in-person communication at schools with periodic messages home, to all-day communication back and forth between students and teachers at home, may have changed the way many teachers think about their relationships with students and their families. As one elementary teacher put it: "...there have been a lot of great opportunities to involve parents at home with projects using Seesaw. This has increased the home-school connection and parents' involvement in their child's schoolwork. I would consider doing this in the future, if students have access to their 1:1 devices that are updated and usable."

Many respondents said they planned to increase teacher-parent communication with comments such as, "I plan to maintain the amount of communication I am now providing families and students via email and blackboard connect." Teachers also described what they saw as the benefits of more communication with parents. One such benefit was what several teachers characterized as *transparency*—the "ability...for parents to see students' progress..." Another way to put this benefit is: "Keep parents updated on Class Dojo and Schoology." One teacher elaborated: "More online support via emails and more social contact by phoning parents to support and discuss their needs. Helping parents to achieve more student engagement and allowing for more productive, academic success." In addition to supporting academic progress, teachers saw increased parent communication as a way to: "monitor their [students'] social emotional learning needs." The general idea was to keep channels of communication open and to maintain relationships that developed during the pandemic: "...open communication, understanding, and professionalism towards families."

Teachers also mentioned specific new communication techniques they planned to use to continue communication with parents. Quite a few mentioned Zoom: "Zoom meetings with parents so they don't have to miss work," or, "Via zoom when I need to communicate with my students' parents now they do not have an excuse to miss an important meeting regarding their child's academic success or decline." Another idea was "Interactive Notebooks and weekly communication with families and students." One teacher planned a "newsletter to students and families."

Teachers also planned to use e-mail, text, and other communications tools to increase their communication with students. For example: "I will continue to use Schoology messages to communi-

cate with students and answer questions." Or, even more enthusiastically: "Constant communication with students via Schoology messaging." One purpose of this communication would be general checking in "with students and how they are doing at school as well a home," but also teachers would be "contacting students who miss an assignment or a day." Additionally, some teachers envision being available to help students with their work after hours: "I will also continue to use the Remind App to be able to communicate with students and provide support when they are working on assignments outside of school hours." Quite a few teachers planned on "Having office hours continue remotely," which provides, "one-on-one time with your teacher." As one teacher put it, online office hours are "...great for students who have a bus to catch but need additional support."

Social-emotional learning

School facilities closures during the pandemic highlighted for many teachers the importance of social-emotional learning (SEL), not only because students were missing out on the socialization that schools help provide, but also because the pandemic itself was adversely affecting so many families' health and finances. Teachers' comments to the open-ended survey question reflected a heightened concern with students' social-emotional well-being and a desire to continue to support students' SEL needs. As one teacher put it, "Students' mental health outweighs anything else right now." To address this need, "Students will have additional access to social/emotional strategies to help cope with the new settings...We have set high academic expectations for all students while continuing to be vigilant and cognizant of all social and emotional needs due to Covid-19." A major technique for supporting students' SEL needs is the daily check-in, which was mentioned by many teachers who wanted to start "...class with an SEL Check-in," or "SEL warm-ups." Seesaw is a tool that teachers use for this purpose in elementary school.

Other teachers developed a newfound appreciation for the importance of SEL and planned to "implement [it] as a regular part of [their] pedagogy." For example, "Dedicating 15 minutes to SEL every day and having Community Circle." One teacher said, "I think I will find more opportunities to incorporate social emotional learning on a daily basis. On our school campus we already utilize meditation and relaxation techniques with many resources like Mind Up and GoNoodle focusing activities. However, I think for the younger students it is very necessary to begin with socialization strategies, calming exercises, and music and art therapy activities, so that students find ways to integrate back into the social and academic expectations and other aspect of school."