



THE CENTER *for* TRANSFORMATIVE
TEACHING & LEARNING™
AT ST. ANDREW'S EPISCOPAL SCHOOL

A Science of Learning Guide to Education Technology

Mapping *EdTech* products to teaching needs

Elementary School Edition

A Note About the Genesis of this Guide

This Science of Learning Guide to Education Technology was created by everyday classroom teachers in an everyday school. It was designed to help teachers use education technology in the most effective way possible. It does this by mapping EdTech tools onto the most promising research in how the student brain learns, works, changes, and thrives.

This guide was created by St. Andrew's preschool through Grade 12 faculty during the COVID-19 pandemic, when teachers around the world were forced to make school happen at a distance. It is built on our more than a decade of experience using the best research that exists to support the social, emotional, and academic growth of all children. As a result, this guide brings together EdTech, the science of teaching and learning, and the lived experience of expert teachers - all in service of the whole-child school experience.

This guide is one of many professional development solutions created by The Center for Transformative Teaching & Learning (CTTL) at St. Andrew's. It is included as a supplemental resource in the Distance Learning track on the CTTL's online professional development platform, Neuroteach Global.

The Distance Learning track is a bundle of existing micro-courses that are most supportive of distance teaching and learning. Together, these micro-courses offer eight hours of professional learning to help you consider how the best research in belonging, memory, metacognition, motivation, mindset, feedback, and social and emotional learning can inform how you challenge and support students. For more information on Neuroteach Global, visit <https://neuroteach.us>.

We hope this guide, and Neuroteach Global, help you on your teaching journey.

The CTTL Team

How to use this Guide

We want to build usable, durable, flexible knowledge. The science of learning suggests this involves three steps: (1) getting things in; (2) processing and storing; (3) getting things out.

Unlike most EdTech guides, ours is teaching-centric. Begin by looking through the blue headings to find the teaching activity you want help with, and browse the tools we suggest.

For more resources from the CTTL, visit thecttl.org

STEP 1: GETTING THINGS IN	
1.1 Building Engagement	
	Start of class
	Engagement "Scooby Snacks" for mid-class emergencies
	Designing for engagement when we create projects and activities
1.2 Delivering content	
	Making videos and narrated lessons
	Making interactive lessons
	Tools to help with live presenting
1.3 Quickly checking for understanding as we deliver content	
1.4 Discussion	
	Having a discussion
	Using student generated input to help drive a lesson

STEP 2: PROCESSING AND STORING	
2.1 Practice of/with recently taught material	
	Guided practice (live in-class, synchronous)
	Independent practice (not live in class, asynchronous, students working "self paced")
2.2 Giving students timely feedback and a chance to act on it	
2.3 Formative assessment of recently learned work (to inform next teaching and studying)	
2.4 Robust storage of material in long term memory (spaced practice & retrieval practice)	

STEP 3: GETTING THINGS OUT. What have you learned so far?	
3.1 Mini-projects (quick, simple multiple-modality demonstrations of learning)	
3.2 Assessment	
3.3 Transfer of recently learned knowledge and skills to a new context	
	Tools to help students create projects
	Tools to help students collaborate on projects

Created by Christine Lewis, Hilarie Hall, Alyssa Morris, Fred Hellbusch, and Ian Kelleher, at [St. Andrew's Episcopal School](http://St.AndrewsEpiscopalSchool.org), Potomac MD. Created by teachers for teachers.

Your feedback, suggestions and classroom stories are most welcome. Please direct correspondence to Ian Kelleher, ikelleher@saes.org

This guide was compiled from the experience of real teachers in real classrooms.

GOOD PRACTICES

General practices that support distance learning

EXPECTATIONS AND ROUTINES

Communicate your expectations (for classwork, projects, behavior, etc.) clearly, even more so than usual

Maintain consistent routines/procedures so students know how to navigate your course (e.g. how to see what work is due when, how to submit work, etc.). Be consistent in how you word instructions

Ensure that all instructions are extremely understandable, even more so than usual

Talk with your students about the importance of eliminating distractions in their workspace as much as possible given their family situation

SETTING WORKLOAD AND CHUNK SIZE

Help students stay at the right level of stress (not too much, not too little)

Reduce the chunk size of new content since distance learning increases cognitive load demands

Balance on-screen and off-screen tasks to reduce screen time. Reducing on-screen time can increase engagement and on-task behavior

THE FLOW OF A CLASS

Be more explicit about linking the current lesson to prior knowledge, skills and lessons

Check for understanding more frequently than during in-person class

Provide more concrete examples up front than usual

Provide more structure for executive functioning tasks than usual (eg. planning, monitoring progress through a project, ensuring work is submitted correctly). Distance learning makes executive functioning harder. Children who can normally handle 4 or 5 steps may now only be able to handle 1 or 2

Keep some energizers in your back pocket just in case – short, fun, interactive games or activities to shift the energy level. These can be presented live, or make a store of short videos of you presenting them

FEEDBACK

Be as prompt as possible when giving feedback as this reduces anxiety

Create more opportunities for giving feedback than usual, but give smaller amounts of feedback and make it more targeted (not trying to fix everything at once)

Create a pattern for work that incorporates feedback and revision. For example, students submit a draft, receive small, targeted feedback, students revise work and resubmit. Practice this routine with students in a fun non-academic way the first time you do it. Eg. Give students constraints for a drawing, have them submit, give feedback about changing the color of this or adding *this* over *there*, students revise based on your feedback then resubmit. You are teaching students how to work with feedback

YOU

Project a sense of composure and confidence with distance learning, even if you have to fake it



CREATING A SENSE OF BELONGING & HELPING STUDENTS FEEL "SEEN" IN THE DIGITAL CLASSROOM

Put students' health and well-being first, and be flexible with your expectations for distance learning

Start every day with an opening meeting that allows every child to be greeted, seen and valued. Include a short share, so that each child hears their voice within the group. Provide the group time to engage in fun activities (such as singing, dancing and games) that nurture cohesion and community identity

Make belonging, and helping all students feel seen, known and heard, be the most critical goals of the first six weeks of school. If all or part of this involves distance learning, work even harder at it

Start each class by checking in on all students (e.g. verbal check-in, visual check-in, a check-in game)

Provide space for students to talk about their emotional state (stress, anxiety, distractions), such as free-writing, free-drawing, or a brief class discussion, when it's needed

Recognize that your students will have different levels of comfort sharing themselves/their homes on video, and be supportive of this

Let students know your availability outside of class time for individual conversations about things they may not want to share in front of the group

Create a safe space (e.g. Google Chat, email, way to post on your Learning Management System (LMS)) for students to reach out to you during instruction/class activities with questions, concerns, or information (e.g. I'm not feeling well) they might not want to share publicly

Students will have different levels of comfort contributing to an online video chat. Give students alternative ways of showing focus and attention, such as chat interaction, poll responses, posting on a Padlet, adding a video to a Flip Grid, etc.

ED-TECH GUIDELINES FOR ELEMENTARY CLASSES

Remember that students cannot navigate these EdTech tools as well as you think because they tend to use them intermittently in regular in-person school

So choose tools carefully. Balance student familiarity with picking the #1 best tool for the job. Choose a small, curated list of core tools that are the go-to tools across the group of teachers a child interacts with. At times have children explore new tools beyond this list—they will surprise you with what they can do—but mostly use this core

As far as possible, have just one place and routine for submitting work. You may have to go beyond this at times, but recognize there is an executive functioning cost. Teach students how to submit work

Ideally introduce EdTech tools to students in person first whenever possible. If you get to meet at the start of the school year, try to build familiarity in-person with key tools. Front-load teaching the executive functioning skills necessary to create and submit work

If using a new tool for the first time during distance learning, start with a play or exploration project whose purpose is to help build the necessary executive functioning. Include a feedback loop where students submit something, get short and targeted feedback from you, revise, and resubmit

Do a project like this before attempting a content driven project (and also revise *your* practice, process and instructions you give based on what you find out). The younger students are, the more important it is, particularly at 2nd grade or younger

Remember, the younger students are, the harder the challenge of using a new EdTech tool is. Include more scaffolding and practice of executive functioning skills for *all* students – and have lots of patience



STEP 1: GETTING THINGS IN

Building Engagement

Start of class	
WEBSITE OR APP	NOTES & TIPS
Youtube and Vimeo videos BrainPOP videos Epic videos and narrated books Screencastify or Loom presentations The Kids Should See This ExplainEDU	Show a brief content-related video to build interest (i.e. it introduces a topic for debate, inspires students to ask questions, draws on previous knowledge, connects classroom content to real-world context)
Polling tool (eg. Padlet , Flipgrid , Poll Everywhere)	Show a prompt for students to write or record a short response to. Use to both spark interest and surface misconceptions. Or write a statement with "agree/disagree" as choices to spark discussion
Newsela	Newsela's instructional content solutions are grounded in learning sciences research focused on student motivation, engagement, and learning strategies
Pear Deck	Add-on for Google Slides. Builds engagement while introducing or reviewing content. Creates interactive questions that can be done synchronously or asynchronously. Includes many templates for engaging questions that you can modify
InShot	App to create sort videos or previews of lessons. Useful for storytime, or to show an example of how to create a project. You can include soundtracks and sound effects to make it more engaging for younger learners. Works on iPad, iPhone, Android
Engagement "Scooby Snacks" for mid-class emergencies	
Kahoot	Some study games like Kahoot can be used as an engagement scooby snack; there are a plethora of Kahoot quizzes created by others that can be played as a fun break, to build community, or boost morale (holiday-themed, random trivia, etc.)
iMovie trailer	Create short content driven trailers to insert novelty and energy in the middle of a longer lesson. Making a movie trailer rather than a full movie dramatically cuts down the time and stress levels of the project, and helps put the focus on learning
Designing for engagement when we create projects and activities	
Bookcreator	Students can create their own books to practice skills (e.g. Spanish vocabulary) or share their understanding (e.g. "how to name a polygon guide"); these can also be shared with classmates as a resource for learning
Flipgrid	Students can create videos to share their understanding (e.g. story elements); these are automatically shared with classmates to use for review

Scratch Jr.	Students can program their own interactive stories and games
Anchor	Students can create their own podcasts
Google Tour Builder	Students can create virtual tours, but be mindful of intention to balance effort and outcome. Provide clear, well chosen constraints to help students focus their effort. As with all projects, show examples to help students see the type of work that is expected of them
Shadow Puppet	Students can use text, add pictures and narrate a video with very little instruction on how to use this tool
Bitmoji	Students can create their own personal emoji to help them personalize their online presence and work
Google Slides	Students can interact with a Google slide template that you have created, or they can interact with a pdf of the slide shared via SeeSaw or your school's LMS. Students can attach links to different parts of the slide, add their Bitmoji, add transparent png images, set up their own virtual classroom image on the slide, design a Bitmoji Field Trip slide, etc.

Delivering content

Making short videos and narrated lessons

Loom	Can embed a webcam video of your face in the screencast which is good for relational connection - circular and less obtrusive
Screencastify	Can embed a webcam video of your face in the screencast which is good for relational connection - square and more obtrusive
ExplainEdu and Explaineverything	Use as a simple way to create a slide containing a video of you to, and mix this in with more traditional slides. Record engaging explainer videos or lessons. They are from the same company; ExplainEdu costs, but offers a highly functional streamlined version for educators. Explaineverything includes a free version and is also a collaborative whiteboard.
iMovie	Can be involved and take more time, but lets you add a rocking sound track in places which can really boost engagement
Quicktime	Can embed a webcam video of your face in the screencast which is good for relational connection - square and more obtrusive
OpenBoard	A whiteboard app with a built in screencasting function that has a large range of functionality with embedded media and applications.
Educreations, ShowMe	Great and simple iPad apps for making videos
doceri	Screencast recorder, whiteboard and presenting tool for iPad

Making interactive lessons	
Pear Deck	Teachers can design interactive Google Slides for students to show understanding (multiple choice questions, short written responses, identification, place a dot to show what you think) and share their thinking with each other, with anonymous results. Can also create self-paced lessons. There are many user submitted lessons that you can start with and adapt
Nearpod	Similar to Pear Deck but less native to Google Slides. Includes augmented reality and virtual field trips, as well as many other kinds of content. There are many user submitted lessons that you can start with and adapt
New "Conversations in the Cloud"	Teachers create an interactive presentation (with images or slides), which students can view and respond to (recording or writing) when prompted. Excellent for highly visual lessons and for having students respond to one another
Tools to help with live presenting	
Explaineverything	Collaborative whiteboard - students can work synchronously or asynchronously
mural.co	Collaborative whiteboard - students can work synchronously or asynchronously. Comes with templates to help structure thinking, built in timers, the power to summon students to certain areas of the board, voting tools
doceri	Interactive whiteboard and screencast recorder for iPad
Quickly checking for understanding as we deliver content	
Pear Deck	Teachers can design interactive slides for students to quickly show understanding. For example, clicking on an answer, typing a short response, or adding a dot or flag to an image or prompt
Google Meet, Zoom, etc	Students can type into the chat function, or show hand signals (eg. thumbs up/thumbs down)
SeeSaw	Can use to create exit tickets. You can schedule push-out times to easily create spaced-practice exit tickets. This is also good to do in regular class, and doing so helps it become quick and easy for students
Poll Everywhere	Create many types of quick response questions and polls to check what your students are thinking. Has some engaging options, like clicking on a smiley-face emoji scale
Padlet	A collaborative pinboard where students can post all forms of media (text, images, video, audio...), and invites discussion
Google Forms	An easy way to make short questionnaires



Discussion	
Having a discussion	
Google Meet chat function	Some students feel more comfortable making contributions or “raising their hand to speak” using the chat feature that video chat programs tend to have
InsertLearning	Embedded discussions help all students share their ideas while reading. Students can annotate any web page and share what they think is important; best used in grades 3-5
Using student generated input to help drive a lesson	
Google Slides	Create template or blank slides beforehand. Assign one slide on one topic to each student or small group. This can be done live, but elementary students may need to generate their slide as a prior class assignment
Padlet	Students respond to a prompt and/or image to spark discussion. Students can post all forms of media (text, images, video, audio...)

STEP 2: PROCESSING AND STORING	
Practice of/with recently taught material	
Seesaw	Generate activities as exit tickets and quick review
HyperDocs	A HyperDoc is a digital document—such as a Google Doc—where all components of a learning cycle have been pulled together into one central hub. Within a single document, students are provided with hyperlinks to all of the resources they need to complete that learning cycle. Having all the resources in one doc helps students with organization
Quizlet	Teacher created reviews with questions, flashcards, games to practice learned materials. Students can also create their own reviews
IXL	Source of practice for math, language arts, science, and social studies
Giving students timely feedback and a chance to act on it	
Seesaw	Comment function allows immediate targeted feedback (both text and voice). Work submitted as a draft and can be sent back with comment to be reworked
LMS (Canvas, Schoology, etc.)	
Google Docs	Teachers can view, annotate (i.e. highlight), and comment on submitted work; students can view this and make changes (upload a second revision of their work)

Google Meet, Zoom, etc	Allows synchronous face-time for feedback and questions
Formative assessment of recently learned work (to inform next teaching and studying)	
Nearpod	Interactive slides with multiple types of formative assessments
Pear Deck	Interactive slides that help students think critically, reflect on the lesson at hand, and more
Padlet (grades 3-5)	Students post their answer to a targeted question.
Robust storage of material in long term memory (spaced practice & retrieval practice)	
Seesaw	Easy to schedule spaced practice
Quizlet (grades 3-5)	Assign students to review flashcards or take one of the types of small practice test on Quizlet and send a screenshot of their work
LMS (Canvas, Schoology, etc.)	Schedule short practice tasks of the same or similar topics spaced out over time
MindMeister, MindMup, bubbl.us	Free online mind mapping software that students can use to make meaningful connections within content areas

STEP 3: GETTING THINGS OUT. What have you learned so far?	
Mini-projects (quick, simple multiple-modality demonstrations of learning)	
Quizlet (grades 3-5)	Quizlet has a feature where students view questions until they've correctly answered twice. This is supported by research on successive relearning, or the importance of retrieving multiple times, not just once. Bonus: Quizlet is a great tool for students to create and use flashcard outside of class, too
FlipGrid (K-5)	Flipgrid is platform where students respond to brief prompts via informal videos. Powerful for both K-12 and higher education, students engage in retrieval practice without even knowing it. Bonus: Students can respond to each other's videos for interactive and elaborative feedback
Book Creator	Create books to show writing or research done. Students can pick a template and include text, drawing, photos and more to demonstrate learning
Seesaw	Students can use images, drawings, voice recordings, and more to demonstrate learning. They can video or take a picture and explain their thinking along the way
Skitch	Students can label pictures, images, maps, or websites

Clips	Clips is an iOS app that allows you to insert videos, images, text and more. Students can create a Clip to show what they know about a topic by inserting videos, voice overs, and more. There are fun features, like filters, stickers, and posters to make it engaging
iMovie	Students can create movies or trailers using photos and videos on iPads. It allows students to be creative while also demonstrating knowledge. They can add text to support pictures. Trailers are a great alternative to traditional book reports. Creating movie trailers instead of a full movie is a great way to reduce the time and stress of a project while still maintaining its essence

Assessment – what do students currently know? What can they currently do?

Seesaw	Allows upload of pen and paper assessments that students can write on and record answers with the microphone function
Canvas, Schoology, other LMS	Many LMS's allow students to add voice or video responses to prompts, in addition to allowing students to upload pictures of pen and paper assessments. Students can also add video and voice annotations to uploaded pen and paper work
FlipGrid	For presentation assessments. Students can create videos to share their understanding; these are automatically shared with classmates. Students can be required to comments on others presentations
Google Meet	For synchronous reading assessment
Spelling City	Individualize spelling and vocabulary assessment

Transfer of recently learned knowledge and skills to a new context

Tools to help students create projects	
See the tools in the "Mini Projects" section above	Most of these tools can be used in two ways: (1) short, simple projects that serve as quick demonstrations of understanding, but adding in modalities other than traditional pen and paper. (2) More extended projects where students are required to use their newly acquired knowledge in a new context as a way to deepen are strengthen their understanding
iMovie	Use with care as it can take a huge amount of time for little benefit in learning. Creating a storyboard to organize your thinking is a crucial step. Consider having students create a movie trailer instead as it makes them have to really condense their thinking, which helps them learn
Explaineverything	Students can collaborate or work independently to easily create visual presentations
Shadow Puppet	Students can use text, add pictures and narrate a video with very little instruction on how to use this tool
EduBlogs	Students can create blogs and e-portfolios, share them with their class, and leave comments for each other

Stop Motion Studio	An app for creating short stop-animation movies. These can be a good way for students to demonstrate their understanding of topics that include a series of steps. iOS and Android; free version available
Google Science Journal	A free app for iOS, Android and Chromebooks to help students do science experiments, with lots of ideas for labs, including an "At Home" section
Tools to help students collaborate on projects	
Google Sites	Students can work collaboratively to make a website with this simple to use tool
Pinterest	Students can create boards to share ideas visually with others
Padlet	Students can collaborate to create a board where they can easily post and share all kinds of media (text, images, video), add comments, and organize what they find
Explaineverything	Students can collaborate to create visual presentations
MindMeister	Students can collaborate on creating mind-maps

FINAL WORD

There is no substitute for a great teachers being physically present in a room with a class of children. You may have stood unobserved by an open door at some point watching this magic happen and know what I mean. This guide was *not* created to drive a technology-first agenda. Rather, it was created to help us find the right EdTech tool for the job when an EdTech tool might be the best tool to use. Or, at times, when they are the only tools in our box.

But we also hope it will help you determine when an EdTech tool is *not* the best tool for the job.

The blue-filled table headings should happen somehow – they are a research-informed rhythm for learning, for building knowledge and skills that are usable, durable and flexible. So ask yourself, *where in these blue-filled boxes am I with my students right now? Is there are EdTech tool that will help my students in this step? Or is there a better way? Let learning drive your EdTech choices, not the other way round.*

The word *plethora* is often misused. It means an *overabundance* rather than *simply lots of*. So I choose this word carefully. There is a plethora of EdTech. Our guide offers a curated list of field-tested tools, used by real teachers in real classrooms. But there are many other tools out there – and many good ones. Look beyond our list, but make *your* EdTech decisions for *your* students with our learning-first approach. Use our table to evaluate where a good tool would help your students, and make sure the tool you choose does this job. Don't try and eat soup with a fork.

If you are from an EdTech company and feel your product was misrepresented or oddly omitted, please get in touch. No harm was intended.