

Integrating Technology into the Curriculum

2nd edition

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Introduction


What is new in education? Everything. This is especially true for the arena of educational technology. It has made its way into classrooms across the United States. One cannot pick up a professional journal without finding a connection to technology. Here are a few headlines taken from the U.S. News and World Report Education section of their website:

- “Study: Emerging Technology Has Positive Impact in Classroom”
- “More High Schools Implement iPad Program”
- “5 Unique Uses of Twitter in the Classroom”
- “LinkedIn Offers New Options for Students”

Technology means many things to many people. For some, it may mean computers and anything electronic. For others, it may mean any equipment necessary for any purpose. Teachers have been using technology in classrooms for many, many years. Recent advances have provided immeasurable support of instructional practices related to teaching and learning. This book provides any teacher in any teaching situation ideas for tools, techniques, strategies, and methods to readily and easily integrate technology into the curriculum for the expressed purpose of advancing student knowledge and personal growth.

On the other hand, today’s technology is not without its challenges, especially for educators. This book attempts to help teachers overcome those challenges and the obstacles they may face enabling them to integrate technology into their lessons to maximize student learning and streamline their instructional planning, feedback, and assessment time.

Over the years there have been many pieces of technology available to teachers, such as the overhead projector, laminators, copy machines, and even multi-colored pens. The goal was and still is to use any available tool as a means to securing a specific student outcome. Often these technological



tools motivate students to quickly become engaged with the lesson and allow them to maintain their enthusiasm throughout the learning process. This excitement is carried throughout the book as each idea is presented and explained.

As new technologies become available, it is thrilling to not only learn about them but to try them out with students. Some accomplish what was hoped; others fall far short. The former tend to be incorporated regularly into classroom routines and practices. The latter are discarded, not wanting to waste time “trying to make it work” just because the teacher next door loves it. Each of us has a unique style, set of comfort levels, and ways of doing things. The ideas in this book are intended to provide a smorgasbord of suggestions so that everyone can find something to implement right away. With the value and emphasis placed on technology in today’s society, teachers, regardless of their own propensity for technology integration, owe it to their students to do all that they can to develop and strengthen their use of technology in the development of lessons and of student application of skills.

Technology today serves to ease the burdens teachers face throughout the school year as well as to enhance student learning and expand educational opportunities for them. We only need to embrace it and provide students with the necessary tools. This generation of students knows a lot about technology. They were born using it. It’s time for schools to get on board, expand their repertoire of technology-related practices, and discover all the wonder that technology can bring to today’s classrooms. This book will inspire you to explore options you may otherwise have only dreamed about.

Chapter 3

Technology to Support Literacy Instruction in English Language Arts

The staff at Edutopia (2007) asked teachers and students, “What technology do you use outside of school that would be good for the classroom? Why? How would that work?” (Join the Conversation). Edutopia lists specific technologies mentioned by respondents. Some may seem to have logical uses in schools, and they may be readily utilized. Others, however, may not seem so obvious, and teachers may not have thought about using these tools in their classrooms. The technologies teachers and students mentioned include:

- Bluetooth
- cell phones
- digital cameras
- flash drives
- graphing calculators
- MP3 players
- laptop computers
- gaming consoles
- public-address systems
- universal remotes
- video cameras
- webcams

This is only a partial list of the technology resources teachers may use with students, and not all teachers may have access to all of these tools. As a result, the focus here will be on ways to integrate technology. The intent is for the options, ideas, and suggestions presented to inspire teachers to move beyond basic applications, such as research reports and drill exercises, and into more creative, thought-provoking activities that will motivate students and engage them with the curriculum at a higher level. Within each content area are ideas to address a myriad of technology standards in an integrated fashion using a host of technology tools. The ideas presented here

Integrating technology into the curriculum requires thought and attention to several factors, including but not limited to the type of hardware and software available, the amount of hardware (e.g., computers, tablets) available, the availability and use of the hardware, the teacher's grade level, and the level of familiarity of students with the technology. Teachers will need to consider their personal classroom situations and make adjustments to integration techniques and strategies as appropriate.

are intended to inspire teachers to find out more about a particular technology. They could even trigger a related idea using the technology available to them and their students.

Technology Integration in Reading

Reading is arguably the most important subject students encounter in school. Even the U.S. Department of Education (2008) urges parents to read at home, stating, “Helping your child


become a reader is the single most important thing that you can do to help the child to succeed in school—and in life” (Parents: My Child’s Academic Success). When a child can read, he or she can pretty much learn anything that might be of interest. Perhaps a student wants to read a popular series of books, a collection of books by a favorite author, or about a specific topic, such as machines, animals, the solar system, or dinosaurs. Perhaps they even want to keep up with current local events, particularly those that have to do with the local area ecosystem. Reading allows children to be independent learners and thinkers. They can select a book off the shelf, read it, and have a greater sense of knowledge and understanding than they did before.

Reading is also arguably one of the most complex skills to teach. Young students must master elements of phonemic awareness and phonics, which lead to greater reading fluency. Readers must also have a set of strategies to understand unknown words and otherwise make sense of the text as they encounter it. Timothy Shanahan, Douglas Fisher and Nancy Frey (2012) cite vocabulary, sentence structure, coherence (how words and ideas are interconnected), organization, and background knowledge (or lack thereof) as the leading factors that inhibit students from comprehending what they read. All of these factors contribute to what Stephanie Harvey and Anne Goudvis (2007) consider to be the most important aspect of reading: comprehension. As teachers tackle each of these reading elements, they must stay focused on the overall goal of comprehension. One of the

notable benefits of incorporating technology into reading instruction is that students can often access a wider variety of reading materials on the Internet than is available in their classroom. As teachers integrate technology into their reading curriculum, the goal does not change. The pitfall for teachers given all of the interactive activities and features that technology-based reading has to offer is that the technology could detract from, rather than strengthen the reading instruction. The following suggestions offer ways for teachers to enhance their reading instruction through the integration of technology. The goal of their lessons drives the choices they make and the use of technology is a supportive tool to further improve students' abilities to read.

Phonemic Awareness, Phonics, and Fluency

Early literacy skills include phonemic awareness (the ability to notice individual sounds) and phonics (the connection between written and spoken language) (ReadingRockets.org). As students learn to decode words that follow specific patterns, they improve their fluency rates, and they are able to apply decoding strategies to words that do not follow a standard pattern or words that break the pattern. Many of these early reading skills focus on application. Therefore, much of the technology available to support teachers with this level of reading instruction is game-like or interactive practice, representative of drill exercises. Even so, teachers can use technology to encourage development of 21st century learning skills.



Phonemic awareness is the ability to notice individual sounds.
Phonics is the connection between written and spoken language (ReadingRockets.org).

The following examples show teachers how to utilize technology resources to develop, reinforce, and/or extend phonemic awareness, phonics, and fluency skills in their students.

- Students can use websites to practice phoneme manipulation (the smallest unit of speech) and build letter-sound recognition.
- Students can access read-aloud books and websites that provide auditory support to build decoding and word-recognition skills.
- Some read-aloud sites provide drill-like practice games, such as matching, for students to read beginning words.
- Some sites require students to think about what they are reading and prove their comprehension of the text.
- Other sites offer story creation where students fill in the blanks, creating a unique story comprised of their chosen words.
- Some sites offer stories in other languages.
- Some sites offer printable activity pages.
- Online stories may include animations, interactive page turning, audio, pop-up vocabulary definitions, and many other interactive features.
- Students can access rhyming websites to practice typing words and then finding words that rhyme. These sites have drop-down menus of words, so students do not need to spell a word perfectly in order to find it. They can begin to type the word, and then find and select the word from the online database. Students can record words that fit a particular word family and/or record words that have similar sounds but do not fit the word family. Figure 3.1 shows a three-column graphic organizer used to sort words that rhyme with *wait*. Students must use critical thinking skills to identify three different spellings of words and then categorize them according to spellings.

Figure 3.1 Recording Rhyming Words and Sorting by Word Families

-ait	-ate	-eight
wait	crate	freight
gait	gate	weight
trait	slate	

These reading websites also provide multi-syllable words practice. Teachers in intermediate grades can use these sites to enhance their instruction with regard to this skill. Students can record themselves reading pretty much anything using audio recording software. When the audio is stored on a data storage site or downloaded onto a flash or jump drive, teachers can listen to it at a convenient time instead of taking class time to listen to each student read. If the teacher has a copy of the text in front of him or her, the teacher may complete a formal running record, obtain an accuracy rate and a reading rate, and analyze error patterns.

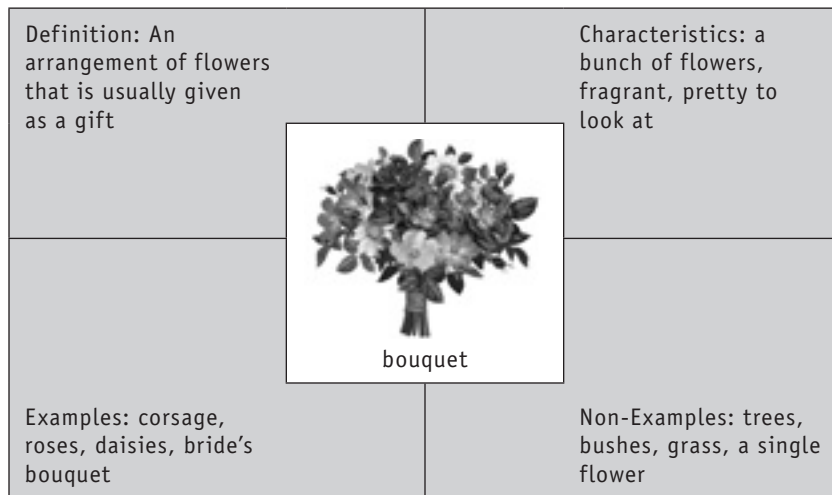
Vocabulary

Research on vocabulary learning has identified three “tiers” of words (Hutton 2008). Tier 1 words are basic, non-multiple-meaning words. These are words we hear and use in everyday life. Words like *coat*, *kitchen*, and *thunderstorm* are Tier 1 words. Tier 2 words are fairly common words but do not necessarily come up in everyday conversation. These are general terms that students may or may not need direct instruction on in order to comprehend a particular passage, such as *particular*, *bargain*, *creek*, and *tuck*. Tier 2 words also include multiple-meaning words. Students may know what a *plant* is (living thing that grows in the ground), but do they know what a *plant* is (factory). Conversely, Tier 3 words are content-specific words, words that generally arise only during a discussion about a particular topic, such as *estuary*, *evaporation*, and *igneous*. They are used infrequently and may never come up in everyday conversation. Teachers likely spend time teaching Tier 2 and Tier 3 words that are essential for students to know for the complete comprehension of a text or subject. Teachers may use different strategies for direct vocabulary instruction to build students’ independent reading skills. The integration of technology can both support and extend students’ vocabulary acquisition and give them tools to use when they come upon an unknown or unfamiliar word.

The following suggestions demonstrate how to integrate technology into vocabulary instruction.

- Rhyming websites can build students' vocabulary skills. One strategy named after Dorothy Frayer from the University of Wisconsin is the Frayer Model (Frederick and Klausmeier 1969). Students include a definition, characteristics, examples, and non-examples in each of four boxes surrounding a word. This model is intended to lead students to a deeper understanding of terms as well as relationships between words in their own lives. Modifications on this model include inserting a picture or using the term in an original sentence. Students can find definitions, synonyms, and antonyms for words from both rhyming sites and online dictionary sites by selecting this option.

Figure 3.2 Example of a Frayer Model Using Words from Online Resources



- Word walls are a popular instructional strategy that teachers use to build and reference key words within a content area or throughout a unit of study, especially in the primary grades. However, Janis M. Harmon et al. (2009) advocate for their use with middle level and secondary students as well. In a study of forty-four seventh graders in two sections of heterogeneously grouped reading classes in suburban south-central Texas, students said they used their classroom word wall “for studying, remembering, writing, and completing classroom assignments” (401).
- Students can use online resources and application software, such as word processors or multimedia slides, to develop their own working set of digital vocabulary cards. These can also be printed and posted in the classroom for easy reference. In addition to including a term and its definition, students can find images or other visual representations of the term. Another option is to have students use a digital camera to find examples of terms around their classroom, campus, or home to download and insert as part of their vocabulary study. This element helps students gain ownership of their learning and encourages creative thinking as they attempt to find examples of ideas around them.
- Students can use poster-making software either on the computer (e.g., Kidspiration and Inspiration) or online (Glogster EDU) to develop concept maps that use the terms they need to learn.
- Word clouds, graphical representations of text, allow students to work collaboratively and can be utilized to preview key vocabulary before reading, check for understanding during reading, and demonstrate mastery after reading. (See example in Figure 3.3.)
- WordSift (see example in Figure 3.4) enables students to sift vocabulary into various formats, incorporate images, highlight words, and provide examples within the original text’s context.

Figure 3.3 Tricky Words Word Cloud (Created in Wordle)

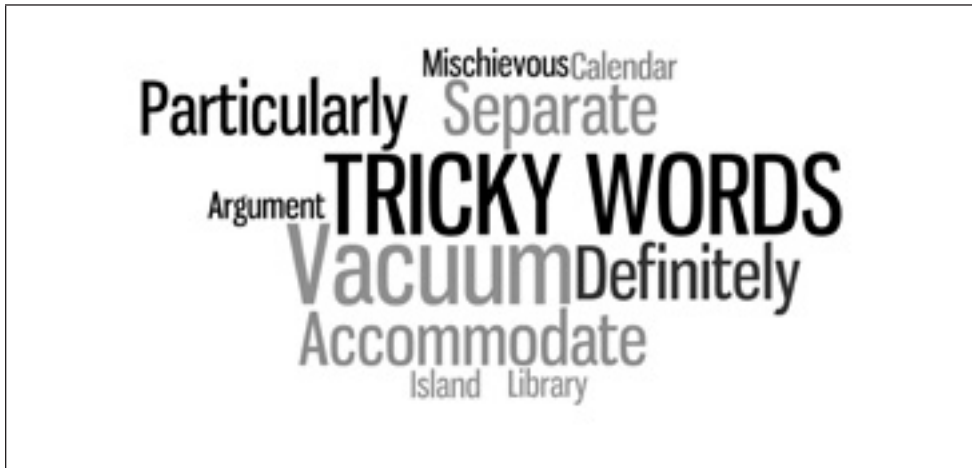
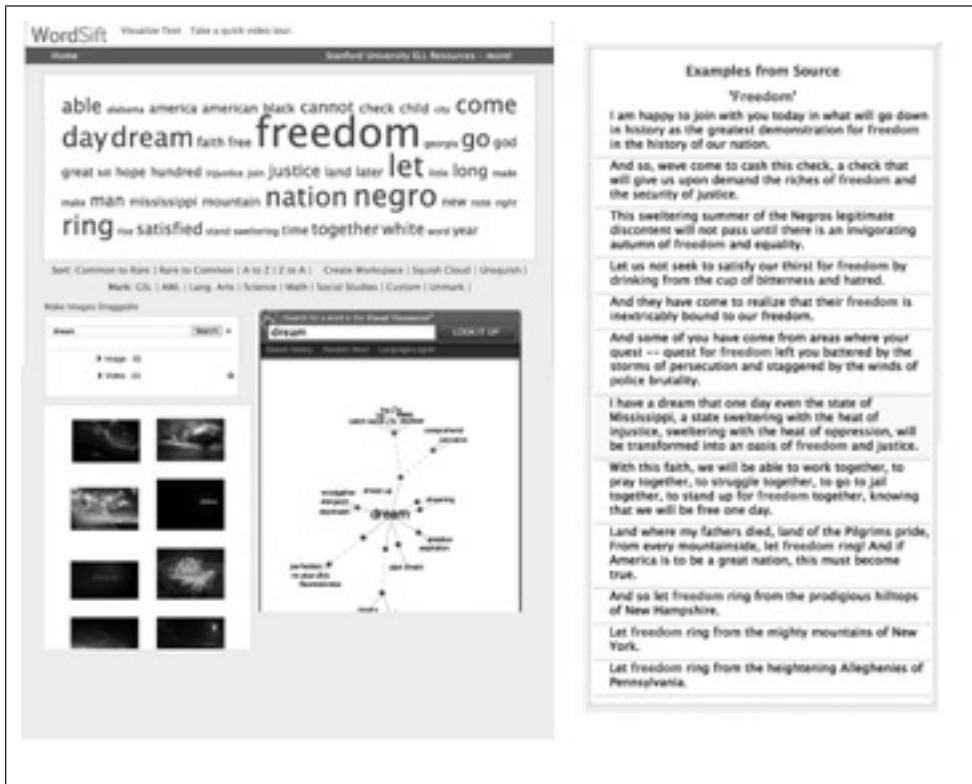


Figure 3.4 Completed WordSift for “I Have A Dream” Speech by Dr. Martin Luther King, Jr. (www.wordsift.com)



research. Alternately, the groups may assign the online work to students who have Internet access at home, and then use the class period to share information and combine their efforts to complete the tasks. This latter suggestion may not allow equitable access to all students for the primary purpose of WebQuests: online learning. However, for teachers facing limited computer use, it is an option.

Interactive Games, Activities, and Simulations

Interactive games, interactive activities, and online simulations were mentioned in Chapter 4 as powerful tools to help students learn the facts and information they need to know, as well as apply concepts and ideas in novel situations. Because they are popular with students, and they effectively reinforce skills students need to master, interactive activities bear mentioning here again as an effective use of online programs.

Games

Robert Marzano (2010) has researched the effects games have on student learning. He has discovered that, “on average, using academic games in the classroom is associated with a 20 percentile point gain in student achievement.” He considers this to be a “relatively strong finding.” Additionally, the benefits of gaming in the classroom include increased memory, class performance, social benefits, and improving the transfer of learning (Salies 2002, para. 2).

When gaming, students use skills and knowledge to win something, accomplish a goal, or reach a desired level. For example, students might have to complete a set of analogies to earn points. Games have several advantages for student learning. They provide engaging, motivating, safe opportunities for students to practice skills they typically need to begin to complete higher-level tasks. Academic game sites usually offer a range of task levels so that students can feel successful and build on their skill set. Games can require analytical thinking, problem solving, planning, and strategy adjustment in fast-paced situations. The goals of games are clear, and students understand the expectations and strive to accomplish them with their academic prowess. Some games provide progress-monitoring options for teachers, so they can monitor student progress as they work

their way through the tasks. Popular online learning game resources may be found at PBS Kids, Scholastic, and Funbrain.

Activities

Activities are similar to games, except students don't really win anything—there's no reward at the end of the skill drill. Students might simply see a score or move on to a more challenging set of tasks. Activities tend to be interactive and offer immediate feedback regarding correct and incorrect answers. They might include interactive word searches, polls, quizzes, or drag-and-drop activities. Popular activity sites include ReadWriteThink and National Geographic Kids. Teachers can also find a slew of ready-to-go interactive whiteboard (IWB) activities. The use of this technology tool is more thoroughly discussed in Chapter 6.

Simulations

Simulations take students through a fictional yet real-life situation with the purpose of reaching a specific goal. They offer students practical, real-world application of knowledge and skills to accomplish an objective. Classroom simulations can positively impact student learning when they are firmly linked to content and learning objectives (Wedig 2010). For example, students might manipulate the temperature of an environment or hunt prey as a predator to keep an ecosystem balanced. Simulations are helpful for both one-to-one classrooms and for classrooms with just one computer. In one-to-one situations, students can work independently or in pairs to engage in the simulation. In classrooms with just one computer, the simulation can be used with the whole class. Student group leaders can converse with their teams and write the desired next step(s) on a whiteboard. The teacher can then act on the most popular choice as the simulation progresses.

Teachers can use purchased games, activities, and resources to provide simulated tasks to students. Alternately, they can access the Internet, find a simulation pertinent to a current topic of study, and set students to their task. One such simulation is called Oregon Trail, which has evolved over the years from its original computer game format. Simulations are generally specific to the content areas. Teachers interested in finding a grade- and topic-appropriate simulation can use their favorite search engine to search

for the topic title and the word *simulations* (or variations such as *simulations for kids* or *simulations for middle school*).

Blogs and Social Networking

Many teachers agree: learning requires interaction and communication. Today's commonplace use of technology to stay connected, including social media, "has widened the dimensions of the available spaces for the social component of learning" (Arora 2013, para. 1). Blogs and social networking are part of everyday life. They permeate every facet of our world from business to politics (Stokes 2011). Students today (and some adults) have a hard time keeping their electronic devices put away for any length of time. They want to be in constant contact with others. Texting today seems as common as talking. The advantage is that the conversation remains quiet and secretive as long as the people texting have their devices on mute. However, as Justin Reich from the Harvard Graduate School of Education reminds us (in a blog sponsored by Common Sense Education), "Even if remarkably high percentages of students report using technology, it doesn't mean they know what they are doing" (Stokes 2011, "Social media are transforming our world—education needs to change, too"). Instead of banishing instant communication altogether, teachers and schools can channel the students' desire to stay connected through more educational channels.

Virtual learning is quickly becoming the norm in classrooms. Schools that have one-to-one technology may use "virtual classrooms" to post and access curriculum material and assignments. Additionally, they typically encourage students to collaborate with one another. These cloud-based classrooms provide real-time learning through a digital platform. Gaggle is one online resource that allows students to safely connect with each other online through both email and blogs.

Using the Internet for Blogging

Blogs have historically been used for personal use; however, there is a purposeful place for them in education. The term *blog* is actually short for *weblog*. Someone who starts a blog has something to say, and he or she wants to share it with the world. These are the diaries of the 21st Century. By posting regularly to a blog site, the author may easily transmit this information to anyone who wants to access the blog. Readers who come to like a particular blog will return time and time again to see what is new and what is trending, or gain more up-to-date information from the author. As a new post is made, the previous posts remain archived and continuously accessible. Some blogs allow for readers to post their thoughts, reactions, or ideas below the blog entry in the comments section, making the blog page interactive.

Blogs are useful to classrooms. They can provide information for parents and offer an informal collaborative discussion forum for parents (and students) to reflect and respond to topics, tasks, and procedures. Teachers can post information about assignments or current topics (including links to videos and other media), and students can reflect on their learning publically (rather than privately in a response journal). These uses definitely increase collaboration and communication among all stakeholders: teachers, parents, and students.

According to Richard E. Ferdig and Kaye D. Trammell (2004), there are four benefits of student blogging. They are:

- students become subject-matter experts;
 - student interest and ownership in learning increases;
 - students are given legitimate chances to participate; and
 - students are provided with opportunities for exposure to diverse perspectives, both within and outside of the classroom.
-

Edublogs is an online resource for teachers wanting to use blogs with students. This organization believes that blogs increase student engagement and help students maintain ownership of and take pride in their own

learning. The Edublogs website offers these tips for teachers wanting to start a blog in the classroom:

- Set clear guidelines and expectations.
- Teach students how to leave meaningful, quality comments.
- Teach students to edit their posts before posting them online.
- Use the posts to engage and motivate students, and improve reading and thinking skills.

Teachers wanting to try out classroom blogs may start by using Edublogs, Blogger (affiliated with Google), SchoolRack, or Teacher Blog It. Teachers should do their research first and make sure the blog resource is age appropriate and offers everything their students will need to successfully publish a blog. Take a tour of the website. Be sure it meets your expectations and is easy enough to use, even for beginners.

Using the Internet for Social Networking for Kids

Many schools caution teachers to stay away from using the leading social networking sites. Schools and/or school districts may even block access to popular sites. However, teachers should be aware that there are a few kid-friendly, safe social networking sites that exist solely for the purpose of allowing students to interact on a global scale without the common concern of maintaining a controlled environment. Sites such as Kidzworld and Yoursphere offer alternatives to unchecked social networking and have links, activities, information, and highlights that interest young students and young teenagers. Students can post comments or reflections related to classroom activities and assignments during school hours, as part of their nightly homework, or simply for fun. Teachers across districts or schools can have students collaborate on projects, using social networking to post websites or other links to information. Teachers can check in with students regarding lengthier assignments, posting questions related to the progress students are making and the challenges they are facing. These sites are viable options for teachers interested in having students meet the national and state writing standards requiring the use of technology to produce and publish writing in addition to collaborating with other students.

Related to social networking is the idea of using video chatting. This online system connects students and classrooms in real time to other

Teacher Resources

Online Resources

Almost a Third Grader

<http://www.almostathirdgrader.com>

Amazing Alex

<https://itunes.apple.com/us/app/amazing-alex-hd/id524334658> (Apple)
or <https://play.google.com/store/apps/details?id=com.rovio.amazingalex.trial&hl=en> (Android)

Animoto

<http://animoto.com>

ArtBabble

<http://www.artbabble.org>

Artifact

<https://artifact.unboundconcepts.com>

ArtsEdge

<http://artsedge.kennedy-center.org/educators.aspx>

Association for Library Service to Children (ALSC)

<http://www.ala.org/alsc/>

BBC Schools

<http://www.bbc.co.uk/schools/scienceclips/>

Blabberize

<http://blabberize.com>

Blogger

<http://www.blogger.com>

Box

<https://app.box.com>