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ONLINE TLE SUPPORT

OPEN DIGITAL EDUCATIONAL TOOLS FOR INTERACTIVE ONLINE TEACHING AND LEARNING

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OPEN DIGITAL EDUCATIONAL TOOLS FOR INTERACTIVE ONLINE TEACHING AND LEARNING

Creating an effective and engaging virtual classrooms is more important than ever. Prior to 2020, teachers might have used digital teaching tools sparsely, but thanks to Covid-19, we are now forced to adopt an entire virtual classroom strategy. In 2020, educational institutions around the world shuttered their physical doors and opened virtual ones in an effort to help students finish their studies. Both educators and students had to adapt to a new emergency at a breakneck speed. As many discovered in their rush to move online, adding 'virtual' in front of the word 'classroom', is not the only difference between a traditional classroom and a digital one. What works in well in one environment may not work well in the other, but everyone needed to figure this out on the fly.

If we want our virtual classes to be engaging, then one has to take real efforts to manage this new digital environment. In fact, according to a 2017 survey conducted by Educause, only 9 per cent of academics prefer to teach in a completely online environment. In virtual classrooms, teachers may worry that they will have no control over their students or the learning environment. Many are worried that there would be some technical glitches or rather there will be. **But virtual classrooms have benefits, too**—not the least of which is the ability to continue learning during a global pandemic. In this chapter, we have put together some guidelines to help teachers to set up a virtual classroom, not only to meet your curricular requirements, but also to encourage student interaction and participation at a time when its needed the most. These are skills that one can use now and in future when we return to the 'new' normal.

What is a Virtual Classroom?

Many instructors have experimented with online teaching, such as educational apps, digital textbooks or even flipped classrooms. But the coronavirus forced colleges and universities to adopt virtual classes in a matter of weeks—and that left many educators and their students feeling overwhelmed. Thankfully, most educational institutions already offer online courses and have at least some of the more important tools in place, so one need not have to reinvent the wheel. However, **adapting your existing lesson plans and teaching methodologies to the virtual classroom isn't something you can do overnight.** To start with, you'll need an online video service or content delivery network (CDN) to host your virtual classroom, so students can view your lectures. Many institutions have a learning management system (LMS) that offers at least some of the features you will need. But that in and of itself may not be enough to deliver a high-quality and engaging learning experience to students.

For students to succeed in remote learning, they need to log into a secure portal to attend class, either with live streamed audio or video. With the right tools, they can still ask questions,

access assignments and lecture recordings, join student discussions, receive feedback, take part in polls and quizzes and even write exams. Like live classes, a virtual classroom allows students to interact with the instructor and with each other. While there may be a technical learning curve for everyone involved, it's important to remember that a virtual classroom is still, ultimately, a classroom. The goal is the same: to engage students and develop subject matter knowledge. The reality is that when used effectively, virtual classrooms can actually boost student success and they are able to access course content from anywhere in the world. Self-paced virtual classrooms allow them to structure their day accordingly based on competing responsibilities. Just as important, a well set up virtual classrooms feed into student success by allowing learners to remain connected before and after class time. Students can communicate with one another informally before class starts, and after class, they may use '*edutech'* tools to complete group work.

How do Virtual Classroom Platforms Work?

First, you need to set up your virtual classroom—instead of brick and mortar, you'll be using software and hardware. Advances in e-learning platforms will make this easier, but for those who are not comfortable with technology (or not comfortable in front of a camera), need to take baby steps as you build up your comfort level. If you're not already using one, check if your educational institution has a learning management system that hosts video lectures, online chats and assignment feedback (most likely many of these features will be supported by your LMS). In some cases, you may have to look at other options to go beyond the confines of an LMS. You can then stream your virtual classes over a content delivery network. It's also possible to stream them over social media, such as Facebook Live, but an open platform like MOODLE, tailored specifically for higher education gives you the ability to structure virtual classes and assess learning.

For example, some platforms will let you take attendance and monitor viewer numbers and engagement, which is particularly important in virtual classrooms. So, you know if students left the stream before it is ended. Some LMS platforms offer in-app attendance, where students can input a unique pin code generated at the start of class. In other virtual classrooms built on software tools, attendance will be automatically taken as students arrive. You may also want to consider making your lectures available for students to view on their own time, which requires video-on-demand, or VOD, capabilities. One has to keep in mind, that your live stream is replacing an in-person lecture, so quality should be the same—not just the content, but the streaming of that content. Grainy video that cuts in and out is not only just frustrating for students, but it makes it hard to maintain focus regardless of the quality of the material.

Many Universities abroad use virtual classrooms with interactive tools to reach remote students. For instance, discussions and dynamic polls can replicate the feel of a traditional classroom. Students can collaborate with classmates and still have access to lectures, course readings and assessments in one spot.

How to Set Up a Virtual Classroom?

Carefully consider the tools and platforms that you will be using. Your virtual classroom should allow for online or e-learning to occur either live or at students' own pace. Coursework, on the other hand, will be completed online via a learning management system (LMS). **Clearly there's room for improvement in the rush to move entire institutions learning online.** When it comes to creating an engaging online classroom experience, it's worth using a high-quality webcam and microphone; a tripod is a definite asset for professional-looking video. Make sure that you have proper lighting and preferably a simple background. If you're using an external video camera, you'll need an encoder to create a compressed version of that video so it can be streamed without buffering. Some students may not have a strong internet connection at home, and without compressed video, their virtual classroom experience may be a grainy one. You may use either a hardware encoder or encoding software; some software is freely available such as the open-source OBS Studio for Windows, Mac or Linux.

There isn't, however, a one-size-fits-all configuration for your virtual classroom. Technophobes can start with the easiest configuration and build from there; technophiles might want to jump ahead to more advanced configurations. One of the easiest configurations is an online slideshow with live audio commentary (but no video). This might be an option if you're trying to get something up quickly and don't have a lot of technical expertise—you just need a computer and microphone. However, audio-only classes can be far less engaging for students. You could also offer pre-recorded video lectures (easily accessible video hosting solutions include YouTube, Loom and Vimeo), which students can access on-demand. Or, you can step it up a notch with real-time live classes.

Live streaming requires a high-quality webcam or video camera so students can see you clearly; opt for a clip-on microphone for the best sound quality. Some virtual classroom solutions let you live stream a lecture while simultaneously running instant messaging or discussion boards so students can ask questions in real time, just like in a live classroom. For those with more technical expertise (and more equipment), it's possible to set up multiple cameras and use switching features, such as a 'split screen' or 'picture within a picture.' This is particularly handy for switching to close-ups of a lab experiment or mathematical equations on a whiteboard. While content is king, it's hard to capture students' attention with low quality video—no matter how good the lecture would be. The right hardware and configuration can complement your content, rather than distract from it.

There is also the matter of synchronous versus asynchronous learning to consider. Synchronous learning allows students to communicate in real time with each other and their instructor through instant messaging, video chat and web conferencing—and get instant feedback. Asynchronous learning, on the other hand, delivers course content online for self-paced learning, but without real-time interaction and communication is done via email or message boards. Typically, students can watch pre-recorded lectures and complete tasks when it suits their schedule. Both can be useful depending on the context (and for hybrid learning models).

Virtual reality (VR) is another tech-savvy option for engaging remote students. For instance, instructors may employ VR to facilitate a field trip to Mars, or for Science, Technology, Engineering, and Mathematics (STEM) students who want to take a look inside the human brain. After implementing virtual reality into their classrooms, educators found that it helped students visualize complex topics such as historical wars and astronomy topics very well. VR also allowed students to access an engaging learning experience from anywhere. Some educators use VR to let students create their own avatars, for notetaking purposes and to gamify the classroom. VR can also ease educators' workload by letting students explore an online environment and communicate and collaborate amongst themselves.

How to Adjust Lesson Plans for a Virtual Classroom?

You already have lesson plans, and you may have spent months or years refining them so they're just right. Now, everything is online—and that requires more refining. Virtual classroom software, however, can help ease this transition. If you are accustomed to using a whiteboard in your courses, you can still use one in your virtual classes. But you'll have to make sure the entire whiteboard is visible in your camera's view. If you don't have access to a whiteboard, then you may need a new way to convey your notes, such as screen-sharing, online white-boarding or slideshow presentations. But your lessons will still be built around lectures, as well as assignments, papers, projects, quizzes and exams. **Just because you have moved into a virtual environment does not mean that you cannot still lead group discussions or assign group projects.** In fact, it's a great way to increase student engagement (and boost morale among those who may be feeling isolated or group shy).

Physical classrooms provide a structure. It is important to try to recreate that sense of structure in a virtual setting too. Communicate your goals and outcomes for the course, possibly with a week-by-week schedule of topics to be covered and what is expected of students. Topics can be broken out into online modules, with tools for discussions, assignments and quizzes, providing that much-needed sense of structure.

How to Engage Students in Virtual Classes?

One of the biggest challenges instructors face in an online learning environment is student engagement. **How do you keep students from drifting off when they're staring at a screen for an entire class?** How do you personalize learning in what can seem like such an impersonal environment? Just as important, how do you form an online learning community? So what can educators do about this?

Some recent surveys suggest that students want more face-to-face interactions with their instructors (such as virtual office hours), more learning materials (such as notes, slides and recorded lectures), faster response times and more time for exams. Educators may not have much time to respond when universities and colleges shuttered their doors to prevent the spread of COVID-19. They had to suddenly switch gears in the middle of the semester. And it's still a work in progress. But it's possible to make virtual classes both instructional and engaging with features such as screen-sharing and real-time chat. **Discussion questions, live polling and**

using multimedia in presentations offer numerous opportunities to encourage student comprehension and engagement. Do not forget that students can use these same tools to create their own presentations, which could be shared with the instructor or the class, a sure-fire way to engage students.

In fact, a virtual classroom can be particularly helpful for shy students who are not likely to raise their hand in a live classroom. But, it may take time to adjust. Every instructor will have to discover what works best for them—and their students. Tools like *Edtech*, for example, can be used to create a sense of community in virtual classrooms. Technology enables educators to create a class climate that strengthens belonging among and between students. For instance, live chat functionality, or breakout rooms, lets students communicate formally and informally amongst themselves. Technology also allows for strengthened feedback loops between educators and students. Virtual office hours grant students access to their instructors while student interest inventories or diagnostic assessments allow professors to take a pulse on students' academic and non-academic circumstances.

How to Maximize Online Learning in Virtual Classrooms?

Even top-end technology would not guarantee your virtual classes resonate with students. Technology is important, but so is keeping up a rapport with your students and supporting personalized learning wherever possible. Through low-stakes online quizzes, for example, you can get a sense of who is keeping up and who is falling behind. There is more to a virtual class than a virtual lecture. **Here are a few ways to maximize the online learning experience for students**, while keeping in mind that not all students have access to the same technology (or high-speed internet access).

- **Assignments:** You can tell students about a new assignment during a video lecture, provide details and deadlines via an LMS or similar platform. Students can then upload their completed assignment (which could include audio or video) onto that same platform. Ideally, you want to use a platform like '*Perusall'* that makes it easy for you to annotate and grade those assignments.

- **Polls and quizzes:** Use low-stakes polls and quizzes to increase student engagement and identify any gaps in learning. Quizzes could also be used for self-assessment, so students can analyze and assess their own performance using multiple-choice or Likert-scale question

- **Group work:** Some platforms allow you to divide the class into virtual breakout rooms to facilitate discussions among small groups of students. This is also useful for peer reviews and collaborative learning.

- **Collaboration:** For groups, consider online collaboration software (which could be as simple as Google Docs) that allows students to co-create and submit collaborative assignments.

- **Online study groups:** Outside of class, virtual social spaces (accessible via a messaging app) can help students socialize, discuss course material and form study groups in a more informal setting—which could be particularly useful for students who feel isolated.

- **Virtual office hours:** Students miss interactions with their instructors, and some may have questions or concerns they don't want to bring up during a live streamed lecture. Consider setting up virtual office hours for students who want those one-on-one interactions; this could even be done over Zoom, Skype, FaceTime or other video conferencing apps.

How to Test in Virtual Classrooms?

Then there is the matter of online student assessment and examinations. How do you conduct an exam when students are at home and you cannot keep an eye on them? This has been a controversial subject. Some institutes of higher learning are cancelling exams in light of the global pandemic, while others are offering students a pass/fail option—though some students would prefer to have a grade. **But the technology already exists for conducting online exams.** Most digital textbooks offer assessments as part of their online platform, including built-in protections to guard against cheating.

For example, you to securely administer quizzes, tests and exams on student computers. You can set specific start and end times and verify identities online to ensure that the right students are taking your test. Students access the exam by inputting a unique auto-generated code shared by the instructor, and proprietary algorithms identify when students are cheating and lock them out of the test automatically. You can also generate an easy-to-understand proctor report that flags irregular student behavior. Or, you could switch up the way students are assessed. Offer an open-book exam, with questions or interpretations that relate to the course material but cannot be Googled. For smaller classes, you could conduct one-on-one oral exams using simple video chat or web conferencing tools. For larger classes where multiple-choice exams make more sense, use randomized questions.

Looking Ahead to Future Learning Initiatives

Last year, the students and parents were okay with "good enough" approach employed by the educational institutions during the pandemic time. But they would not put up with mediocrity forever. While they missed the in-person interactions last year, they also certainly see the value in online learning, and many would prefer a blended approach to learning. **There are purpose-built tools to help educators deliver interactive classes and high-quality learning experiences online and in blended courses.** Today, educators can bring active learning to the virtual classroom by streaming live lectures, taking attendance, presenting slides, hosting discussions and recording presentations for later viewing. With the uncertainties surrounding COVID-19, higher education institutions may be going digital for the foreseeable future. But even when life returns to 'normal,' having these tools in place will be of great benefit—not just

when universities and institutions shut down for bad weather or natural disasters, but also as part of blended or hybrid learning initiatives. Students may miss the structure, stability and value-adds of campus life, like study spaces, career events and student activities. But, if there is a silver lining, it is that educators and students are becoming much more comfortable—and much more savvy—with virtual classroom technology and all of its possibilities.

Teaching –Learning Interactions and Activities

Having been explained ways in which how virtual classrooms can be conducted efficiently and effectively, it will not be helpful if information on the tools for engaging students in online classes are not provided. The 2014 Gates Foundation report, *Teachers Know Best: What Educators Want from Digital Instructional Tools*, indicates that teachers want tools "supporting student collaboration and providing interactive experiences". This doesn't come as a big surprise since these types of tools are fun and engaging. They also support 21st century skills like collaboration, communication, and creativity. All those tools mentioned in this chapter are free at the basic level with paid adding options for additional features.

A listing of 25 top notch free tools that are being used in schools and classrooms was compiled. These tools are useful for collaborate and interact on assignments, projects, and other active learning efforts. Many of these applications are totally free, while others have levels of functionality starting at free and then adding additional capabilities through paid options. These tools deliver a wide array of functionality, from communication to collaborative document editing, whiteboards, and gaming, to full Learning Management System capabilities. There's something here for everyone!

1. **Moodle**

The Moodle™ Learning Management System (LMS) provides educators across all levels and industries with a highly functional, flexible, and interoperable digital learning solution through open-source technology . Moodle™ stands for Modular Object-Oriented Dynamic Learning Environment. Founded and developed by Martin Dougiamas in 2002, Moodle™ was designed to provide educators, administrators, and learners with an open, robust, secure and free platform to create and deliver personalized learning environments. Moodle™ is a user-friendly Learning Management System (LMS) that supports learning and training needs for a wide range of institutions and organizations across the globe.

Today, Moodle™ is the most widely used Learning Management System in the world, with well over 100,000 registered implementations worldwide supporting over 150 million learners. Moodle™ delivers a powerful set of learner-centric tools and collaborative learning environments that empower both teaching and learning. Because of its flexibility and scalability, Moodle™ has been adapted for use across education, business, non-profit,

government, and many other community systems of all sizes. Additionally, Moodle™'s modular and interoperable design allows developers to build plugins that can integrate external applications to enhance system capabilities and extend what is possible with the core Moodle™ product. There are more than 1,400 plugins in the Moodle™ plugins directory that are freely available for the Moodle™ community to use, and Moodle™'s open code base encourages users to create their own as needed to share with the open-source community at large.

2. Google Classroom

Google Classroom is a great strategy to introduce students to methods for accessing information and communicating/collaborating online in a self-contained environment that is safe and easily accessible. Google Classroom can be introduced from the elementary and fully utilized in middle and high school. Google Classroom greatly increases the accessibility of materials to students and collaboration while working on assignments.

You already need to have a Google account and your institution technology administrator has registered for G Suite for Education. If institution has not registered yet, he has to register your institution and create Google accounts for the staff and students.

The beautiful thing about Google Classroom is that it is self-contained so that only people in your domain have access to it, so it adds a level of privacy for school-age children. On the other hand, you will find you cannot share your classroom with others outside your institutional domain because of the privacy rules. Guardians can receive email summaries of their student's progress if this option is turned on.

3. **Twiddla** (www.twiddla.com)

Twiddle provides a really easy to use collaborative online whiteboard. This "no setup web based meeting playground" is quick and easy – inviting others to collaborate by just hitting the green GO button to start a session and then use the Invite option. This app provides a great set of tools. You can easily add an image, web page, or document as a background to mark up. There is a colour palette tool, pen width tool, a shapes tool, and text can be inserted. There's even a chat option built in.

4. **Google Drive** (drive.google.com)

Most of you are probably already familiar with Google Drive, which lets you share and collaboratively edit Google Docs with anyone else who has a Google account, for free. Sweet. Being able to collaboratively edit documents and worksheets opens up a world of possibilities for interactive classroom activities and projects.

5. **Bubbl.us**

This free tool* allows users to easily create bubble maps, that can be exported in various formats, saved (by exporting and re-importing them in an appropriate format), and yes … edited collaboratively. The use of bubble maps as a teaching tool has been a good practice for decades, but bringing it to a new level by enabling collaborative editing through an online tool is totally 21st century!

**The Basic plan lets you create, share, and collaboratively edit 3 Bubble Maps.*

6. **Edmodo** (edmodo.com)

This multi-platform, device agnostic, kid-safe platform is perfect for active learning – share content, have a dialogue (in or out of the classroom), and even get parents involved! A rich set of features including collaboration-enabling functions like Learning Communities and Discussions have encouraged over 34 million teachers and students to adopt Edmodo, making it one of the most popular free education tools on the Web. Check out "10 Reasons Why Edmodo is an Excellent (and Hugely Popular) Digital Learning Platform" to learn more.

7. **Yammer** (yammer.com)

Yammer is a private social network. Work in groups, share files, co-edit content and more with their free Basic plan. Explore “5 Ways Yammer is Improving Communication, Connections, and Learning in our Schools” to learn more.

8. **Skype** (skype.com)

This popular, widely known platform provides for group meetings tools that can be particularly effective for remote participants to come together. For example, if you’re thinking about collaborating with a remote classroom, Skype can be huge asset in doing so. Skype is also great from bringing students who might be stuck at home due to illness or other situations into the classroom to join the class for a collaborative dialogue or other activity.

9. **Vyew** (vyew.com)

Vyew is a collaborative interactive white board. It's come a long way since we first covered it on EmergingEdTech years ago. Not only can you create a collaborative whiteboard on line, you can upload images and document and write over them, have a discussion around them, and more. Check out the "What is Vyew" video on their home page to learn more. The free version only allows for a small set of users (10 real time participants), but that can work well if you set up a few separate groups. Larger groups of participants aren't too expensive, starting at $10/mo.

10. **Wikispaces** (wikispaces.com)

Wikis provide an easy place to create a members-only web site where users can have discussions, share documents and so on. Wikispaces was built for education. They even have a special "classroom" tool that is focused on Collaborative Writing: Wikispaces Classroom.

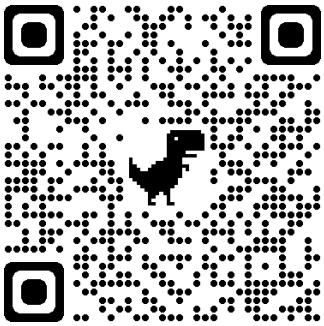
11. **Facebook** (facebook.com)

Yeah, that's right – Facebook. If you put up a group page specifically for your class, you get a place of you own to collaborate. Of course, this is only for kids over 13. There are a lot of

teachers using Facebook. Check out Facebook Summit 2011, an Excellent Academic Use of the Popular Internet App to learn about one teacher's fun project using Facebook.

12. **Google Hangouts** (www.google.com/hangouts)

Google Hangouts in becoming an increasingly popular alternative to Skype for bringing remote groups of people to together to communicate and collaborate. A couple advantages Google Hangouts has is the potential to have a Hangout recorded, and the fact that you are less likely to have the occasional availability issue that the free version of Skype can have. Combine Google Hangouts and Google Drive (or many of the other tools in this list) and you can collaboratively edit content while you're "hanging out"!



13. **Cacoo** (cacoo.com)

Create flowcharts and diagrams online with real time collaboration. This a very useful tool in a wide variety of academic disciplines, and being able to collaboratively edit them makes Cacoo a powerful application. Here's a link to learn about and access their free Academic plan: https://cacoo.com/lang/en/academic.

14. **Titanpad** (titanpad.com)

What about collaboration on the iPad? Well, a number of the tools in this listing will work fine on many platforms, but Titanpad is geared specifically towards the iPad. TitanPad lets people work on one document simultaneously, and you can get a space for your team on your own private subdomain for free.

15. **HaikuLearning** (www.haikulearning.com)

Haiku is a popular education site, and it's free for teachers – the solo plan includes 5 classes with up to 2GB of storage (with the ability to upgrade for a fee if you need more). This cloud-based app provides content sharing, assignments, feedback, grading, and more. Somewhat along the lines of Edmodo, Haiku is a basic Learning Management System that provides rich tools for the classroom.

16. **Twitter** (twitter.com)

Just search out a unique hashtag and you're in business. Using a hashtag and a tool like Tweetdeck (also free), where you can dedicate a column to a specific search phrase (your hashtag in this case) and bam!, you've got a live stream of all content posted with that hashtag. Collect and share research or news, create a class poem or story (one student posts to the hashtag at a time, taking turns to build out the content), search out subject matter experts and follow them, and so on. Here's 100 Ways to Teach With Twitter.

17. **Minecraft** (minecraftedu.com)

Multiplayer games can be a great way to provide an interactive, collaborative experience in the classroom. With a little know-how, Minecraft players can interact. Read this article to learn more about teaching using Minecraft: Gamifying the Classroom with Minecraft – the Possibilities are Powerful and Endless!

18. **Economics-games** (economics-games.com)

Here we have a purpose-built multiplayer game for the classroom. Economics-games.com is a free educational games site for teaching microeconomics, industrial organization and game theory. “Choose the game you want to run, enter the number of players and that's it: You just have to communicate their logins to your students and have them connect to the site with their phones, tablets or laptops. You can then observe and debrief the game through your interface.”

19. **World of Warcraft** (wowinschool.pbworks.com)

Check this site out to learn all about using World of Warcraft and other “MMPORGs” (massively multiplayer online role-playing games) in the classroom. Through this site, all project materials, including a fully-developed language arts course, aligned to middle grades standards, are now available under a creative commons license.

20. **Bounceapp** (www.bounceapp.com)

Review, notate, share, and discuss any web page with Bounceapp. Bounceapp makes it really easy to grab a web page screen shot and make notes on it. This can then be sent to others. User can share ideas on the same site by each grabbing, notating, and then sharing their work.

For a more collaborative experience, Bounce will work with Notableapp.com to let a workgroup collaborate (Notableapp is not free, but there is a free 30 day trial).

21. uReply

uReply is a classroom communication system from Chinese University of Hong Kong for use with smartphone. uReply is a web based Student Response System (SRS) to use with mobile devices designed to facilitate interactions for learning. In other words, teacher asks a question in the classroom computer and students input answers via the uReply app. The system supports many question types including MC and open-ended questions. Students' feedback is collected and analyzed in the format of graphs or tables for showing in the classroom for enhanced learning effect. Records of the class activities are saved in the system.

22. Padlet

Padlets are like the noticeboards at the back of classrooms, just that they exist on the Internet. They are just spaces for you and your students or fellow colleagues to go crazy and post either text, links to other websites, images, sound clips or even videos. Yes, pretty much everything. And they'll be there for everyone to see, just like a noticeboard.

23. Mentimeter

Mentimeter is an easy-to-**use** presentation software **used** by more than 25 million people. With **Mentimeter** you can create fun and interactive presentations. We help you make your events, presentations, lectures, and workshops innovative and memorable. Unlike traditional presentations, **Mentimeter** gives your audience the chance to interact with you the presenter. This means that as the presenter you **should** factor into account that people need time to answer the questions you are asking them

24. Pixton – Free comic storyboard.

Pixton allows teachers and students to construct their own comic strips. There are a variety of comic strip layouts, numerous character and background choices, and a ton of creative options. This is a great learner-centered tool that allows students to construct their own knowledge and display it in a way that is meaningful to them by allowing them to create comics representing their concepts and ideas. Pixton is accessible through any

web browser and can be accessed on phones, tablets, and computers. Pixton offers a free app for smartphone or tablet use

25. Renderforest & Powtoon

Renderforest and Powtoons are n online video production platform that allows individuals and educators to create “broadcast quality” videos for private or educational use. Their few versions are free to use and anyone can register as a user in a few simple steps.

In addition to the above the following set of free tools can provide an endless array of collaborative, interactive class work for years to come. Happy collaborating everyone!

- Animoto – Gives students the ability to make a short, 30-second share video of what they learned in a given lesson.
- AnswerGarden – A tool for online brainstorming or polling, educators can use this real-time tool to see student feedback on questions.

- The Answer Pad – Allows teachers to capture data from students using the web or the app and is touted as being ideal for the flipped or blended classroom.
- AudioNote – A combination of a voice recorder and notepad that captures both audio and notes for student collaboration.
- Backchannel Chat – This site offers a teacher-moderated version of Twitter. An extension of the in-the-moment conversation might be to capture the chat, create a tag cloud, and see what surfaces as a focus of the conversation.
- Biblionasium – This online, safe, and simple book network allows teachers to view books students have read (a digital reading log), create reading challenges for students, and track progress. Students also can review and recommend books to their peers on the site.
- Binumi – Powering cloud-based video platforms for the world's most forward-thinking organisations
- BookSnap – While currently this app is only available for iOS, it provides a digital way for learners to interact with text and with other learners.
- Buncee – A creation and presentation tool that helps students and teachers visualize, communicate, and engage with classroom concepts and ideas.
- Chatzy – Use Chatzy to support backchannel conversations in a private setting. These live chats make great companions to classroom discussion, provide exit tickets, or keep a discussion going after the class is over.
- ClassKick – This app allows teachers to post assignments for students, so both the teacher and peers can provide feedback on the assignment. Students can monitor their progress and work.
- ClassPulse – A mobile and web app that increases student engagement outside of the classroom by creating a more collaborative environment.
- ClassVR – Virtual environment for primary school students
- Coggle – A mind-mapping tool designed to understand student thinking.
- Conceptboard – This software facilitates team collaboration in a visual format–similar to mind-mapping, but using visual and textual inputs. Compatible on tablets and PCs, Conceptboard can work from multiple devices.

- Crowdsignal – Quick and easy way to create online polls, quizzes, and questions. Students can use smartphones, tablets, and computers to provide their answers, and information can be culled for reports.
- Dotstorming – A whiteboard app that allows digital sticky notes to be posted and voted on. This tool is best for generating class discussion and brainstorming on different topics and questions.
- Educreations Interactive Whiteboard – A whiteboard app that provides students the tool to share understanding and comprehension.
- Edulastic – Allows teachers to create standards-aligned assessments quickly and get instant feedback from students to adjust learning.
- eSurvey Creator – A tool that allows teachers to quickly and easily build questionnaires and surveys. There is a free option but it's for a limited period of time.
- Expeditions – Google Expeditions is an immersive education app that allows teachers and students to explore the world through over 1000 virtual-reality (VR) and 100 augmented-reality (AR) tours. You can swim with sharks, visit outer space, and more without leaving the classroom.
- Five Card Flickr– Designed to foster visual thinking, this tool uses the tag feature from photos in Flickr.
- Flipgrid – This tool has been recently updated. Students can use 15-second to 5-minute videos to respond to prompts; teachers and peers can provide feedback.
- ForAllRubrics – This software is free for all teachers and allows you to import, create, and score rubrics on your iPad, tablet, or smartphone. You can collect data offline with no internet access, compute scores automatically, and print or save the rubrics as a PDF or spreadsheet.
- Formative – This online, all-student response system provides teachers the opportunity to assign activities to students, receive the results in real time, and then provide immediate feedback to students.
- FreeOnlineSurveys – Allows teachers to create surveys, quizzes, forms, and polls quickly and easily.

- GoSoapBox – Free for less than 30 students, this all-student response system works with the Bring Your Own Device (BYOD) model, so no charge for a clicker. One of the most intriguing features for me is the Confusion Meter.
- iBrainstorm – An iPad app that allows students to collaborate on projects using a stylus or their finger on screen.
- Kahoot – A game-based classroom response system, where teachers can create quizzes using internet content.
- Kaizena – An online tool for providing students with real-time feedback on their digitally-uploaded work. Teachers can highlight or speak to give verbal feedback and attach teacher-created, reusable resources to student work.
- Lino – A virtual corkboard of sticky notes so students can provide questions or comments on their learning. These can be used like exit tickets or during the course of a lesson.
- Micropoll – A great tool for quickly creating polls and analyzing responses. Polls can be embedded into websites as well.
- Naiku – Teachers can easily and quickly create quizzes that students can answer using their mobile devices. Great for checking for understanding before and after a lesson.
- Nearpod – This tool is nice in that you can not only gather evidence of student learning, like an all-student response system, but you can also create differentiated lessons based on the data you collected. The basic version (30 students or less) is free.
- Newsela – A great collection of online resources and articles.
- Obsurvey – Create surveys, polls, and questionnaires quickly and easily.
- Pear Deck – Plan and build interactive presentations that students can participate in via their smart device. Limited free usage, and it offers unique question types.
- Peergrade – A platform that allows teachers to create assignments and upload rubrics. Students upload work and are anonymously assigned peer work to review according the rubric.
- Piazza – A platform that allows teachers to upload lectures, assignments, and homework; pose and respond to student questions; and poll students about class content. This tool is better suited for older students as it mimics post-secondary class instructional formats.

- Pick Me! – An easy to use app for an iPod, iPad, or iPhone that facilitates random student selection. Can be organized by class for convenience.
- PlayPosit – An interactive video and assessment tool that allows teachers to add formative assessment features (pauses and questions) to survey what students know about the topic. Teachers choose from a library of video content from popular sites such as YouTube, Vimeo, and others.
- Poll Everywhere – Teachers can create a feedback poll or ask questions. Students respond in various ways, and teachers see the results in real-time. With open-ended questions, you can capture data and spin up tag clouds to aggregate response. There is a limit to the number of users.
- Pollmaker – A popular polling tool that has some unique features, such as allowing multiple answers to one question.
- ProProfs – Build and test knowledge with quick quizzes, polls, and surveys.
- The Queue – Free educational chat tool that mirrors Twitter and allows teachers to post questions and students to respond via the thread. Students can respond via text or video, and the tool allows "journeys" in which teachers introduce a topic via video and connect students to participating resources. Great for gathering formative assessment data at the beginning, middle, or end of units.
- ThingLink – An interactive panel, where a picture or a video is a canvas with linked hot spots.
- Quia – Teachers can create games, quizzes, surveys, and more, and access a database of existing quizzes from other educators.
- Quick Key Mobile Grading App – Helps teachers with accurate marking, instant grading, and immediate feedback for better student engagement.
- QuickVoice Recorder – Another free voice recording app for the iPhone or iPad that allows you to record classes, discussions, or other project audio files. You can sync your recordings to your computer easily for use in presentations.
- Quizalize – A great tool that allows teachers to easily create quizzes and homework for students. Teachers can then see how the students did and identify areas for improvement.

- Quizlet – Create flashcards, tests, quizzes, and study games that are engaging and accessible online and via a mobile device.
- Quizizz – Interesting assessment forms.
- RabbleBrowser – An iPad app that allows a leader to facilitate a collaborative browsing experience.
- Random Name/Word Picker – This tool allows the teacher to input a class list and facilitates random name picking. You can also add a list of keywords and use the tool to have the class prompt a student to guess the word by providing definitions.
- RealtimeBoard – Teachers can invite students and collaborate with the whole class in real-time.
- Remind – A free tool that allows teachers to text students and stay in touch with parents. A great 'check for understanding' tool that's easy to use.
- Seesaw – This tool helps teachers improve parent communication and makes formative assessment easy, while students can use the platform to document their learning.
- ShowMe Interactive Whiteboard – Another whiteboard tool that students and teachers can use to check understanding.
- Socrative – Exercises and games that engage students using smartphones, laptops, and tablets.
- Sparkpost – This app from Adobe allows teachers to add graphics and visuals to exit tickets.
- Spiral – A quick tool that gives teachers access to formative assessment feedback.
- SurveyMonkey – Teachers can create and deliver online polls and surveys.
- SurveyPlanet – Another survey creation tool that teachers can use to gauge student learning.
- Tagxedo – A tag cloud generator that allows you to examine student consensus and facilitate dialogue.
- Telegami - A mobile app that lets you create and share a quick animated Gami video.
- Triventy – A free quiz game platform that allows teachers to create quizzes students take in real-time. These live quizzes provide teachers with real-time data on student understanding of classroom concepts. Students need individual devices to respond to quiz questions (compatible with mobile devices and laptops).
- Typeform – A poll creation tool that lets teachers add in graphical elements.

- Verso – Described as a feedback tool, this app allows teachers to set up learning using a URL. Space is provided for directions. Students download the app and input their responses to the assignment. They can then post their comments and respond to the comments of others. The teacher can group responses and check engagement levels.
- Visme – Free infographic software.
- Vocaroo – A free service that allows users to create audio recordings without the need for software. You can easily embed the recording into slide shows, presentations, or websites. Great for collaborative group work and presentations.
- VoiceThread – Allows you to create and share conversations on documents, diagrams, videos, pictures, or almost anything. This facilitates collaborative student discussion and work.
- Voxer – Consider using this voice recording tool as a way to let students listen and self assess their ideas and assignments. You can send recordings to parents, so they can hear how their students are doing, let students chat about their work, or provide feedback to students.
- WeVideo – An online video editor.
- Wiser – Interactive blended worksheets.
- Wordables – The Word Cloud Guessing Game. This app allows you to elicit evidence of learning or determine background knowledge about a topic. These word clouds are pictures composed of a cloud of smaller words that form a clue to the topic.
- WordArt – This word cloud generator has an added feature that allows the user to make each word an active link to connect to a website you determine.
- Wordle – Generates tag clouds from any entered text to help aggregate responses and facilitate discussion.
- WordSalad – This app generates word clouds from the text you provide, and they can be exported and shared.
- XMind – A mind-mapping software for use on computers and laptops.
- Yacapaca! – Allows teachers to create and assign quizzes with ease.
- Zoho Survey – Teachers can create surveys that students can access and take using a mobile devices. Teachers can see results in real-time.
- Zotero – A personal research assistant.

Websites for Coding and Programming

- Petlja – resources for computer science classes (programming) per official curriculum in Serbia
- Startit - series of articles on programming in Serbian language (this is the first in the series)
- FreeCodeCamp - list of online places where you can learn things related to programming – all for free (in English language)
- Škola koda - commercial coding school with a lot of online material for free
- Web programiranje - handy articles for entering the word of programming, all in Serbian language
- Kampster - LMS is very good, the courses available for free look very good, and so does the classroom communication system. They also have a solution for schools.

Educational Video Channels

- Big collections on YouTube that cover many channels:

https://www.youtube.com/education

https://www.youtube.com/user/teachers

https://www.youtube.com/user/BIEPBL

https://www.youtube.com/user/DiscoveryEducation

- SUPER NAUKA – An interesting series of videos that provide answers to the peculiar questions that bother us all, from why the sky is blue to what virtual reality is. It is narrated in Serbian, and the narrators are famous people from Serbian culture and art spheres who explain the phenomena in a nice way.
- Easy Start - Educational platform with recorded video materials accompanying the curriculum of primary school in the Republic of Serbia.

Selection of useful YouTube channels:

- Khan Academy – One of the best known collections of video tutorials for a wide variety of subjects for different ages. Mobile phone app can also be used for the collection. It can be used together with the platform that is in Serbian https://sr.khanacademy.org/.
- BBC Teach – A large database for 22 subjects from kindergarten to secondary school. Teaching materials on the website can also be used with the videos https://www.bbc.co.uk/teach
- TED ed – A large collection of animated stories about various phenomena – scientific, social and artistic. Animated stories can be used with the platform TEDed, which provides the opportunity for interactive collaboration between teachers and students, with quizzes, reflections and reference materials that can be further used.
- PhET – A channel with a large number interactive simulations of experiments in physics, chemistry, biology and mathematics, used together with the platform https://phet.colorado.edu/. Depending on the subject, can be used for all school ages.
- Veritasium – A very interesting channel with a lot of unusual experiments, puzzles, songs that are used as reminders for various scientific concepts (for example, Atomic Bonding). It could be best used for upper primary school grades and secondary school.
- Crash Course – A channel with scientific phenomena presented in a very funny way. It covers a variety of topics, from historical facts to astrophysics problems. Intended for secondary school students, but if adapted and more thoroughly analysed, it can also be used for upper primary school grades.
- AsapSCIENCE – A rich collection of animated videos that address various scientific questions. The humorous animation can be very interesting for lower grades, even when the topics are very difficult to understand.
- Art for Kids Hub – Over a thousand videos for drawing instructions. Intended for younger ages.
- Peekaboo Kidz – Cute videos for young children answering various questions “Why? How?”
- It's AumSum Time – Very cute animations on various “What if...?” questions that may be interesting to students of lower primary school grades, such as “What if we lived on Mars?”.

- National Geographic – A collection of videos accompanying the articles on the website National Geographic. Particularly interesting are the 360º videos, such as exploring the coral reef where the viewer can direct the picture and travel along the seabed.
- Kurzgesagt – In a Nutshell – Nicely animated short videos providing answers to various questions from various fields with the motto "Nothing in the universe is boring if you tell a good story". Can be used for all grades.
- The Organic Chemistry Tutor – A collection of videos presenting instructions for solving problems in organic chemistry.
- Step-by-Step Science – Explains concepts in physics, chemistry, mechanics, electronics and astronomy for secondary school students.
- MIT OpenCourseWare – Video recordings of lectures by MIT professors on various topics such as bitcoin economics or stellar archaeology. Intended for university students, and in an adapted form maybe for students of vocational secondary schools.
- Educational Documentary – A large collection of feature-length documentaries produced by BBC, National Geographic, History Channel, Discovery Channel, etc. Some last 30 minutes, but there are others that last for an hour and a half.
- Philosophy Tube – A collection of video stories about philosophy but in a very modern and entertaining way. It covers various topics, from the Introduction to Hegel's Philosophy to the modern ethical issues.