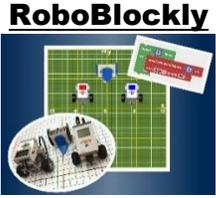


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Tool	Link	Description	Cost - Adds on needed	Main use	Age Restrictions
	<a href="https://education.lego.com/en-us">https://education.lego.com/en-us</a>	<p>Practical learning tools at this developmental level develop students' creativity and support STEAM's integration. They introduce students to STEAM concepts while improving the skills of cooperation, communication and problem solving, programming, engineering, etc.</p>	<p>It depends on the product of your choice</p>	<p>Programming / Robotics</p>	<p>3-12+</p>
	<a href="https://www.terra-pinlogo.com/bee-bot-family.html">https://www.terra-pinlogo.com/bee-bot-family.html</a>	<p>Bee-Bot is an exciting robot designed specifically for use by young children. This colorful, easy-to-operate, and friendly little robot is a perfect tool for teaching sequencing, estimation, problem-solving, and just having fun!</p>	<p>Depends on the number of the pieces you want to purchase</p>	<p>Programming / Robotics</p>	<p>3-7</p>

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 <p><b>RoboBlockly</b></p>	<a href="https://www.roboBlockly.org/">https://www.roboBlockly.org/</a>	<p>RoboBlockly is a web-based robot simulation environment for learning coding and math. Based on Blockly, it uses a simple puzzle-piece interface to program virtual Linkbot, Lego Mindstorms NXT and EV3, as well as to draw and animate for beginners to learn robotics, coding, math, science, and art. Blocks in RoboBlockly can be executed in debug mode step-by-step.</p>	Free	Programming / Robotics	8-9+
 <p><b>Arduino</b></p>	<a href="https://www.arduino.cc/">https://www.arduino.cc/</a>	<p>Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online etc.</p>	It includes online purchases and downloading of software	Coding / Programming	10+
 <p><b>Scratch</b></p>	<a href="https://scratch.mit.edu/">https://scratch.mit.edu/</a>	<p>Scratch is a block-based visual programming language and website targeted primarily at children. Users of the site can create online projects using a block-like interface. The service has been translated into 70+ languages.</p>	Free	- Coding / Programming	8-16+

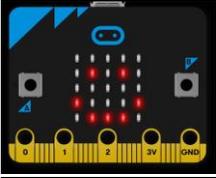
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<p><b>MakeMakey</b></p> 	<p><a href="https://makeymakey.com/">https://makeymakey.com/</a></p>	<p>An electronic invention tool and toy that allows users to connect everyday objects to computer programs. Using a circuit board, alligator clips, and a USB cable, the toy uses closed loop electrical signals to send the computer either a keyboard stroke or mouse click signal.</p>	<p>You need to purchase it</p>	<p>Programming</p>	<p>6+</p>
<p><b>App Inventor</b></p> 	<p><a href="https://appinventor.mit.edu/">https://appinventor.mit.edu/</a></p>	<p>App Inventor lets you develop applications for Android phones using a web browser and either a connected phone or an emulator. The App Inventor servers store your work and help you keep track of your projects.</p>	<p>Free</p>	<p>Programming</p>	<p>9-12+</p>
<p><b>Python</b></p> 	<p><a href="https://www.python.org/">https://www.python.org/</a></p>	<p>Python is a general purpose and high-level programming language. You can use Python for developing desktop GUI applications, websites and web applications. Also, Python allows you to focus on core functionality of the application by taking care of common programming tasks.</p>	<p>Free</p>	<p>Programming</p>	<p>7+</p>

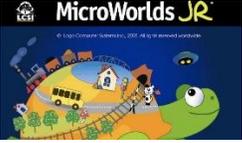
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<p style="text-align: center;"><b>Micro.bit</b></p> 	<p style="text-align: center;"><a href="https://microbit.org/">https://microbit.org/</a></p>	<p>It is a pocket-sized computer 70 times smaller and 18 times faster than the original BBC Micro computers used in schools. It has 25 red LED lights that can flash messages and be used to create games. There are two programmable buttons that can be used to control games or pause and skip songs on a playlist.</p>	<p>You need to purchase it online</p>	<p>Programming</p>	<p>8-14</p>
<p style="text-align: center;"><b>Raspberry Pi</b></p> 	<p style="text-align: center;"><a href="https://www.raspberrypi.org/">https://www.raspberrypi.org/</a></p>	<p>The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.</p>	<p>It includes online purchases and downloading of software</p>	<p>Programming/ Robotics</p>	<p>8-12+</p>
<p style="text-align: center;"><b>Algodoo</b></p>	<p style="text-align: center;"><a href="http://www.algodoo.com/">http://www.algodoo.com/</a></p>	<p>Algodoo is a unique 2D-simulation software designed in a playful, cartoony manner, making it a perfect tool for</p>	<p>Free</p>	<p>Modeling</p>	<p>6+</p>

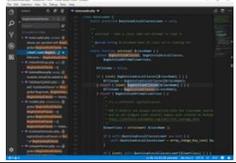
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		<p>creating interactive scenes. Explore physics, build amazing inventions, design cool games or experiment with Algodoo in your science classes.</p>			
<p><b><u>Microworlds EX and JR</u></b></p>  	<p><a href="http://www.microworlds.com/">http://www.microworlds.com/</a></p>	<p>MicroWorlds EX is a coding environment that empowers students to create and share interactive games, perform mathematical experiments, explore science simulations and write multimedia stories.</p> <p>MicroWorlds JR for Pre-K to Grade 4 the child in full control. No reading is necessary. It's easy to learn and use with simple, point &amp; click operations and child friendly symbols. Encourages children to explore mathematical and other "big" ideas such as numbers, geometry, patterns and movement.</p>	<p>Purchase is needed</p>	<p>Programming</p>	<p>5-9 / 10+</p>

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 <p><b>Lego WeDo 2.0</b></p>	<a href="https://education.lego.com/en-us/downloads/wedo-2/software">https://education.lego.com/en-us/downloads/wedo-2/software</a>	<p>LEGO WeDo is a robotics hardware and software platform specifically designed for Kindergarten to Grade 2 students. As with other LEGO Education products it follows the 4 C's process– Connect to a story, Construct a model, Contemplate its function, and Continue improving its design.</p>	Free software download	Modeling	3+
 <p><b>Lego Mindstorms</b></p>	<a href="https://www.lego.com/en-gb/themes/mindstorms">https://www.lego.com/en-gb/themes/mindstorms</a>	<p>Lego Mindstorms is a hardware and software structure which is produced by Lego for the development of programmable robots based on Lego building blocks.</p>	You need to purchase it	Robotics	10+
 <p><b>VisualStudioCode</b></p>	<a href="https://code.visualstudio.com/docs">https://code.visualstudio.com/docs</a>	<p>Visual Studio Code is a source-code editor developed by Microsoft for Windows, Linux and macOS. It includes support for debugging, embedded Git control and GitHub, syntax highlighting, intelligent code completion, snippets, and code refactoring.</p>	Free software download	Programming	

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	<a href="http://www.lightbot.com">www.lightbot.com</a>	LightBot is a puzzle game based on coding; it secretly teaches you programming logic as you play!	You need to purchase it	Programming	4+
	<a href="http://www.kodable.com">www.kodable.com</a>	Kodable is a complete K-5 curriculum taking students from learning to think like a programmer in Kindergarten to writing real JavaScript by 5th grade. Kodable provides easy to follow lesson plans focused on student outcomes so teachers can teach their students to code.	Free	Programming	4-11
	<a href="https://www.solarsystemscope.com/">https://www.solarsystemscope.com/</a>	Solar System Scope is a model of Solar System, Night sky and Outer Space in real time, with accurate positions of objects and lots of interesting facts.	Free	Astronomy	
	<a href="https://stellarium.org/">https://stellarium.org/</a>	Stellarium is a planetarium software that shows exactly what you see when you look up at the stars. It's easy to use, and free.	Free	Astronomy	

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	Tinkercad.com	Tinkercad is a free, easy-to-use app for 3D design, electronics, and coding. It's used by teachers, kids, hobbyists, and designers to imagine, design, and make anything!	Free	Programming	3-12
	<a href="https://sciencejournal.withgoogle.com/">https://sciencejournal.withgoogle.com/</a>	Science Journal transforms your device into a pocket-size science tool that encourages students to explore their world. As they conduct eye-opening experiments, they'll record observations and make new, exciting discoveries.	Free	Experiment tool	17-19

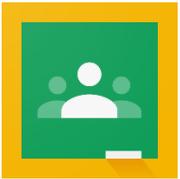
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<p><b>Physics Toolbox</b></p> 	<p><a href="https://play.google.com/store/apps/details?id=com.christianvieira.physics.toolboxsuite&amp;hl=en">https://play.google.com/store/apps/details?id=com.christianvieira.physics.toolboxsuite&amp;hl=en</a></p>	<p>This app uses device sensor inputs to collect, record, and export data in comma separated value format through a shareable .csv file. Data can be plotted against elapsed time on a graph or displayed digitally. Users can export the data for further analysis in a spreadsheet or plotting tool. This app also generates tones, colors, and a stroboscope.</p>	Free	Experiment tool	8+
<p><b>Europeana</b></p> 	<p><a href="https://www.europeana.eu/el">https://www.europeana.eu/el</a></p>	<p>Europeana provides access to millions of books, music, artworks and more – with sophisticated search and filter tools to help you find what you’re looking for.</p>	Free	General resources	

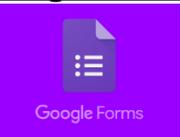
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<b>Sciencedemoguy</b> 	<a href="http://Sciencedemoguy.com">Sciencedemoguy.com</a>	Looking for great ideas for your Science, STEM or STEAM classroom? What about FREE lesson Plans, materials lists, video demonstrations, instructions and grading rubrics?	Free resources as well as some to purchase	General resources	
<b>CLEO.net.uk</b> 	<a href="http://www.cleo.net.uk/resources/index.php?ks=3&amp;cur=3">http://www.cleo.net.uk/resources/index.php?ks=3&amp;cur=3</a>	Online Software about: Electric circuits, Plato's Cave, Climate Change and others.	Free	General resources	
<b>Google classroom</b> 	<a href="https://classroom.google.com/">https://classroom.google.com/</a>	Google Classroom is a free web service, developed by Google for schools, that aims to simplify creating, distributing, and grading assignments in a paperless way. The primary purpose of Google Classroom is to streamline the process of sharing files between teachers and students.	Free Individual licenses upon payment	Sharing files	

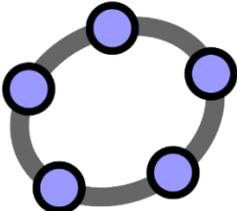
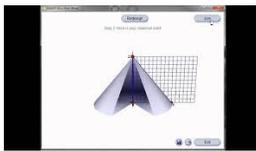
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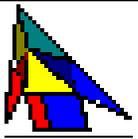
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<p><b><u>National Geographic</u></b></p> 	<p><a href="https://www.nationalgeographic.com/">https://www.nationalgeographic.com/</a></p>	<p>The National Geographic Society is a global nonprofit organization committed to exploring and protecting our planet. We fund hundreds of research and conservation projects around the world each year and inspire new generations through our education initiatives and resources.</p>	<p>Magazine and Channel need a subscription</p>	<p>General resources</p>	
<p><b><u>Google forms</u></b></p> 	<p><a href="https://docs.google.com/forms/u/0/?tgif=d">https://docs.google.com/forms/u/0/?tgif=d</a></p>	<p>Google Forms is a web-based app used to create forms for data collection purposes. Students and teachers can use Google Forms to make surveys, quizzes, or event registration sheets.</p>	<p>Free</p>	<p>Research tool</p>	
<p><b><u>Plotly chart studio</u></b></p> 	<p><a href="https://chart-studio.plotly.com/create/#/">https://chart-studio.plotly.com/create/#/</a></p>	<p>Plotly is a data visualization company that makes it easy to build, test, and deploy beautiful interactive web apps, charts and graphs—in any programming language.</p>	<p>Free Certain versions need payment</p>	<p>Graphs/charts</p>	
<p><b><u>Sketchpad</u></b></p>	<p><a href="https://sketch.io/sketchpad/">https://sketch.io/sketchpad/</a></p>	<p>A sketchbook is a book or pad with blank pages for sketching and is frequently</p>	<p>Purchase a license to</p>	<p>Arts</p>	

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		used by artists for drawing or painting as a part of their creative process.	unlock the full feature		
<b>Geogebra</b> 	<a href="https://www.geogebra.org/?lang=en">https://www.geogebra.org/?lang=en</a>	GeoGebra is a Dynamic Mathematics Software (DMS) for teaching and learning mathematics from middle school through college level. It also provides basic features of Computer Algebra Systems (CAS) to bridge some gaps between geometry, algebra and calculus.	Free	Geometry	6+
<b>Dalest</b> 	<a href="https://pavel.it.fmi.uni-sofia.bg/elica/dalest/dalest.html">https://pavel.it.fmi.uni-sofia.bg/elica/dalest/dalest.html</a>	It offers the opportunity to develop a dynamic 3D geometric reality in a microcosm, which allows students to construct, observe and manipulate geometric shapes in space and enhances teachers' efforts to achieve an understanding of stereometry for their students.	Free	Geometry	

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<p><b>Cabri Geometry</b></p> 	<a href="https://cabri.com/en/">https://cabri.com/en/</a>	The program allows the user to move geometric shapes. Relationships between points in a geometric object can be easily demonstrated. There are also graphics and display functions that allow you to explore the connections between geometry and algebra.	Free for testing  Includes product purchase online	Geometry	
<p><b>EucliDraw</b></p> 	<a href="https://euclidraw.software.informer.com/2.5/">https://euclidraw.software.informer.com/2.5/</a>	EucliDraw is a program that draws figures of the plane Euclidean geometry. It simulates the paper surface, the ruler, the compass and dozens of other specialized tools, that enable you to draw complicated figures, instantly and with high precision.	Free	Geometry	
<p><b>SimCalc</b></p> 	<a href="http://kaputcenter.org/products/software/simcalc-mathworlds-software/">http://kaputcenter.org/products/software/simcalc-mathworlds-software/</a>	An application that allows to work with multiple representations (tables, graphs, etc.), dynamic use and interaction with algebra, design of mathematical activities, etc.	Free	Algebra/Graphs	8+

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<p><b>Matific</b></p> 	<a href="https://www.matific.com/">https://www.matific.com/</a>	<p>Online mathematics teaching resource for schools. Focuses on improving core skills such as addition, subtraction, division, multiplication and more.</p>	<p>Free to try For full use needs yearly payment</p>	Algebra	7+
<p><b>Microsoft Math Solver</b></p> 	<a href="https://math.microsoft.com/en/">https://math.microsoft.com/en/</a>	<p>Educational program, designed for mobile platforms (iOS and Android), that allows users to solve math and science problems.</p>		Algebra	
<p><b>Linear Algebra</b></p> 	<a href="https://play.google.com/store/apps/details?id=com.varsitytutors.learningtools.linearalgebra&amp;hl=en">https://play.google.com/store/apps/details?id=com.varsitytutors.learningtools.linearalgebra&amp;hl=en</a>	<p>The course can range from more elementary topics, such as performing arithmetic operations on matrices, to more complex topics, such as vector spaces and hyperplanes. Work toward a greater understanding of these topics through Varsity Tutors' free Linear Algebra app for Android devices.</p>	Free	Algebra	

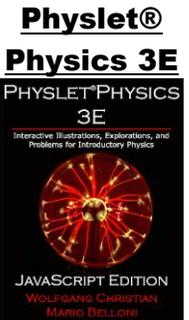
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<b>Mathway</b> 	<a href="http://www.mathway.com">www.mathway.com</a>	Mathway provides students with the tools they need to understand and solve their math problems.	Free. For step-by-step work and explanations upgrade is needed	Algebra	
<b>Symbolab</b> 	<a href="https://www.symbolab.com/solver/algebra-calculator">https://www.symbolab.com/solver/algebra-calculator</a>	It is an online service that computes step-by-step solutions to mathematical problems in a range of subjects.	Free version available	Algebra	
<b>GoLab</b> 	<a href="https://www.golabz.eu/">https://www.golabz.eu/</a>	Find the largest collection of online labs, try interactive exploration of applications, combine labs and applications in research learning areas, and share them with your students and colleagues.	Free	Online labs and lessons	5+
<b>The Physics Aviary</b>	<a href="https://www.thephysicsaviary.com/">https://www.thephysicsaviary.com/</a>	Cross-platform, run-anywhere, programs to help physics students master the big ideas in physics.	Free	Science resources	

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	<a href="https://www.compadre.org/physlets/">https://www.compadre.org/physlets/</a>	<p>The Physlet Physics web site provides a technology-enhanced introduction to physics. Interactive javascript simulations are used to illustrate and explore physics topics, covering the material found in most introductory courses. The broad topics covered are Mechanics, Fluids, Waves, Thermodynamics, Electromagnetism, Circuits, and Optics.</p>		<p>Simulations</p>	
<p><b>(In Spanish)</b> <b>Curso interactivo de física</b></p> 	<a href="http://www.sc.ehu.es/sbweb/fisica3/index.html">http://www.sc.ehu.es/sbweb/fisica3/index.html</a>	<p>El Curso Interactivo de Física en Internet, es un curso de Física general que trata desde conceptos simples como el movimiento rectilíneo hasta otros más complejos como las bandas de energía de los sólidos. La interactividad se logra mediante los 646 applets insertados en sus páginas webs que son simulaciones de sistemas físicos, prácticas de laboratorio, experiencias de gran relevancia histórica, problemas interactivos, problemas-juego, etc.</p>	<p>Free</p>	<p>Science resources</p>	

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Tool	Link	Description	Cost - Adds on needed	Main use	Age Restrictions
 <p><b>Phet Interactive Simulations</b></p>	<a href="https://phet.colorado.edu/">https://phet.colorado.edu/</a>	PhET is a suite of research-based interactive computer simulations for teaching and learning physics, chemistry, math, and other sciences. They emphasize the connections between real-life phenomena and the underlying science, and help make the visual and conceptual models of expert scientists accessible to students.	Free	Simulations	5+
 <p><b>National Library of Virtual Manipulatives</b></p>	<a href="http://nlvm.usu.edu/">http://nlvm.usu.edu/</a>	A library with unique interactive, virtual manipulations, mainly in the form of Java micro-applications, for teaching mathematics.	Free	Math applications	4-5+
 <p><b>Gizmos</b></p>	<a href="https://www.explorelearning.com/">https://www.explorelearning.com/</a>	Gizmos are interactive simulations of mathematics and science. More than 400 Gizmos aligned with the latest standards to help teachers bring new learning experiences in the classroom.	Some of them are free others need to be purchased	Math and science applications	8-9+

## Suggestions of Technological Tools for STEAM

In the table below, we provide suggestions of technological tools which can facilitate the implementation of STEAM methodology in various stages of the learning process. This list was developed based on suggestions by the partners and the advisors (mainly teachers) of the Polar Star project. For each tool, a basic description is presented, as well as information (when provided by the developers) about the age restrictions and cost and/or adds on needed.

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<b><u>Illuminations</u></b> 	<a href="https://illuminations.nctm.org/">https://illuminations.nctm.org/</a>	Illuminations works to serve you by increasing access to quality resources based on quality standards for teaching and learning mathematics, including interactive tools for students and educational support for teachers.	Purchase needed	Tools and resources for teaching mathematics	4-5+
<b><u>Kahoot</u></b> 	<a href="https://kahoot.com/">https://kahoot.com/</a>	Create analyzes and reports, trivia quizzes or quizzes of any type and language. Participants can play your game / quiz from their device, all of them on the same time.	Free version. For unlimited number of participants in your quiz you need an upgrade	Assessment	16+ <i>(to create an account)</i>
<b><u>Plickers</u></b> 	<a href="https://get.plickers.com/">https://get.plickers.com/</a>	Plickers is an interactive tech tool that uses printable “paper clickers” instead of clicker devices. Each student is assigned a unique Plickers card that has a black and white image similar to a QR code. Plickers is a terrific formative assessment tool, but it can be used for much more than assessment.	Free	For assessment purposes	13+ <i>(to create an account)</i>
<b><u>Padlet</u></b>	<a href="https://padlet.com/">https://padlet.com/</a>	Padlet is an application to create an online bulletin board that you can use to display information for any topic. You can add images, links, videos, columns for	Free trial Monthly charge for full features	Brainstorming/ assessment/ sharing	13+ <i>(to create an account)</i>

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		sorting or refining organization, and more.			
	<a href="https://quizizz.zen-desk.com/hc/en-us">https://quizizz.zen-desk.com/hc/en-us</a>	Quizizz allows you to conduct student-paced formative assessments in a fun and engaging way for students of all ages. Questions appear on each student's screen, so they can answer questions at their own pace, and review their answers at the end.	Free	For assessment purposes	
	<a href="http://www.pinup.com">www.pinup.com</a>	A quick and easy to take sticky notes and share with your friends.	Membership needed	Brainstorming/ sharing	
<b>Google Slides</b>	<a href="http://www.google.com/slides/about/">http://www.google.com/slides/about/</a>	Ability to insert images, formatted text, animations, other media. The use of a variety of templates. The ability to edit transitions between slides. Collaborative editing for sharing between computers, devices, and other users.	Free	Presentations	

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Tool	Link	Description	Cost - Adds on needed	Main use	Age Restrictions
 Google Slides					
 <b>Google Jamboard</b>	<a href="https://jamboard.google.com/">https://jamboard.google.com/</a>	Google Jamboard is a whiteboard-like 4K touch display you can use for meetings and presentation purposes. Turn it on, draw on it, flip through slides on it etc. Google has added G Suite support to Jamboard, so users will be able to directly access and edit Docs, Sheets, Slides, and photos stored in Drive.	Free	Presentations/ sharing	
 edpuzzle	<a href="https://edpuzzle.com/">https://edpuzzle.com/</a>	Easily create beautiful interactive video lessons and check if students are watching your videos, how many times they're watching each section, and if they're understanding the content.	Free	General resource (video lessons)	
<b>Mentimeter</b>	<a href="https://www.mentimeter.com/">https://www.mentimeter.com/</a>	Mentimeter is a tool that lets you engage and interact with your audience in real-time. The audience simply votes via mobile phones.	Free  Monthly charge for full features	Assessment / brainstorming	12+ <i>(to create an account)</i>

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<b>Powtoon</b> 	<a href="https://www.powtoon.com/index/">https://www.powtoon.com/index/</a>	PowToon is Web-based animation software that allows you to quickly and easily create animated presentations with your students by manipulating pre-created objects, imported images, provided music and user created voice-overs.	Free Monthly charge for all features	Animated presentations	18+ <i>(to create an account)</i>
<b>Glogster</b> 	<a href="https://edu.glogster.com/">https://edu.glogster.com/</a>	Glogster is a cloud-based (SaaS) platform for presentation and interactive learning. It allows users to mix all kinds of media on a virtual canvas to create multimedia posters, and access a library of engaging educational content created by students and educators worldwide.	Free	Creating visual content	
<b>Prezi</b>	<a href="https://prezi.com/">https://prezi.com/</a>	A prezi is a presentation of text and visuals that you zoom in and out of. It is very similar to a power point, except you do not make slides. Instead, you make one big prezi and zoom in to different views. You can show a prezi to others on	Free	Presentations	

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 <b>Prezi</b>		a computer through your prezi account, or you can link to them.			
 <b>Canva</b>	<a href="https://www.canva.com/">https://www.canva.com/</a>	Canva is a graphic design platform that allows users to create social media graphics, presentations, posters and other visual content. Users can choose from many professional designed templates and edit the designs and upload their own photos through a drag and drop interface.	Free  You can purchase and upgrade.	Creating visual content	13+ <i>(to create an account)</i>

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<p><b>AnswerGarden</b></p> 	<p><a href="https://answer garden.ch/">https://answer garden.ch/</a></p>	<p>This is an easy-to-use online feedback app that can be used to elicit brief answers from your respondents. It adopts a minimalist design that allows users to create, share, answer, and manage topic questions without signing up for accounts. Although a simple app, it has the potential to be used to accomplish a wide range of education tasks, such as brainstorming, polling, synchronous and asynchronous communication, and formative assessment.</p>	<p>Free</p>	<p>Assessment / sharing</p>	
<p><b>Google Sheets Spreadsheets</b></p>  <p>Google Sheets</p>	<p><a href="https://www.google.com/sheets/about/">https://www.google.com/sheets/about/</a></p>	<p>Google Sheets is an online spreadsheet app that lets you create and format spreadsheets and work with other people.</p>	<p>Free</p>	<p>Research tool</p>	