16 Apps, Websites for Including Students with Disabilities in STEM Education

Teachers as "learning engineers" was a theme of a 2014 webinar focused on how to structure successful learning for students with disabilities in science, technology, engineering, and math (STEM) education using technology and apps.

"I want you to think less like a teacher and more like an engineer," Jamie Basham told his webinar audience as part of a project of the Center on Online Learning and Students with Disabilities. He is an associate professor in the Department of Special Education at the University of Kansas. His area of interest includes student learning in modern learning environments. The one he likes best is Universal Design for Learning (UDL), which examines "various constraints in our environment and designs solutions around all the problems that we have."

In a federally-funded webinar, he shared the following apps and tech solutions that show potential to deal with barriers to learning by students who struggle with complex texts and the scientific methods needed to problem-solve in the sciences. Only 5% of students with disabilities enter into the STEM workforce, he notes. The National Science Foundation envisions a more world-class, broadly inclusive STEM workforce where all students excel in:

- Critical thinking

- Applied content

- Authentic learning

- Collaboration

- Problem solving

The design of STEM learning environments is focused on doing problem-based, project-based, and challenge-based learning. Through the lens of UDL, Basham says, the learning environment can engage students with disabilities with other learners. To do so, educators must put into place a purposeful and proactive design for supporting learner variability through instructional design, instructional strategies, and materials. This includes technology for overcoming barriers that learners may encounter as they move throughout the curriculum and learning environment, he said.

"Importantly, I think it is about iterative design, so whenever we design something, we don't let it stand forever on its own. We take data and evaluate whether we are actually overcoming the barriers that we intended to overcome, and then, redesign. Designs should impact the way we teach, the tools in use, and the strategies and materials," he said.

Here are some of Basham's (2014) suggested tools or websites for STEM education:

- iTunes U: for "thousands of (customized) videos, podcasts, college courses, and even some K-12 courses that can be accessed on multiple devices"

- iBooks: for interactive books for the iPad or desktop that is inexpensive when compared to other textbooks

- iBooks Author: a free app for Mac that lets teachers and students make interactive iBooks on any subject area

- Text Compacter: to summarize and simplify text

- Text2Mindmap: a tool to use your text to create a visual representation that organizes information

- Scratch: a free programming language and online community to create your own interactive stories, games, and animations

- Visual Dictionary: a word finding aid supported with images

- Visuword Online Graphical Dictionary: a visual dictionary and thesaurus that connect words using diagrams

Potentially useful apps:

- Bill Nye the Science Guy: a free 20th anniversary app exploring scientifically fascinating places on Earth and possibly beyond!

- My Robot Friend: math, science, reasoning for upper elementary with some crude humor and mild violence

- Treehouse: programming and design

Apps he uses now in a UDL scheme:

- MyScript: handwriting calculator where the students write by hand on a mobile device and the app translates it into type

- Videolicious: tool to quickly make videos

- Google Docs Evernote: productivity tool used in some virtual STEM courses that could help students with disabilites learn note-taking skills

- Nearpod: free intereactive tool for teachers to create lessons for mobile devices or check for student learning

Log on to download a handout entitled "Tech and Apps to Address STEM in Online Learning for Students with Disabilities" with Basham's full listing of resources from this webinar.

To learn more about UDL, go to the National Center on Universal Design for Learning for guidelines that aid planning for learner variability and information about learning barriers. Basham suggests The Universal Design for Learning Implementation and Research Network (UDL-IRN) website that offers a community of learners who are interested in implementation strategies and supports. There, you can download files addressing UDL Critical Elements and an Instructional Planning Process.

AIM-VA and counterparts in other states provide accessible educational materials (formerly called "accessible instructional materials" in another funding cycle) to eligible students who experience learning barriers due to print disabilities. There are 12 formats that are alternatives to textbooks and trade books in print. Students receive these learning aids free of charge in order to access their grade-level curriculum. Eligibility is decided at their Individualized Education Program planning meeting where consideration for AEM=AIM and assistive technology take place. To learn more, residents of the Commonwealth of Virginia can start on the AIM-VA homepage. All who are interested can contact their special education teacher or school adminstrator to get started.

The Center for Online Learning for Students with Disabilities Identifies and verifies trends and issues related to the participation of students with disabilities in K-12 online learning in a range of forms and contexts (e.g., virtual schools, online courses, expository, interactive, etc.). It is funded by the Office of Special Education Programs at the University of Kansas, with CAST and the National Association of State Directors of Special Education.