

Special Education Needs within Technology

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Technologies have brought efficiency, productivity, creativity, and accessibility to the general population. Digital technology has furthered these benefits while reducing cost, increasing access to a global level, and allowing for customization within seconds. Within education, digital technology, allows for differentiated learning, individualization, and personalization (Dikusar, 2018). It allows teachers and students to interact autonomously in the classroom and through distance learning (Dikusar, 2018). Geography and synchronicity are no longer limiting factors through digital learning. The benefits of technology and digital technology are not limited to just the mainstream population, it also a great resource within special education. Unfortunately, not all technology design effectively or meaningfully support special needs learner's diverse needs.

Special Education

With the passage of the Individuals with Disabilities Education Act (IDEA) in 2004, which protects individuals with disabilities, students have free access to special education (Roblyer & Hughes, 2019). IDEA ensures learners with special needs have access to the level of support necessary for them to receive equal education. Support to special needs learners may include physical therapy, motor skills development, and speech therapy, all of which may or may not include technology support (Roblyer & Hughes, 2019). A special needs learner's individualized education program (IEP) provides the framework of their customized support program. With a focus on mainstreaming and inclusion, it is a mandate to provide as much general education time rather than only specialized pull out sessions (Roblyer & Hughes, 2019). Mainstreaming, inclusion of special needs learners in the main classroom, offers benefits to both mainstream students and the special needs learners, as all individuals need to learn to appreciate

differences, to adapt, and to effectively collaborate in the real world.

Special Education and Technology

Through the use of Universal Design for Learners (UDL), which promotes multiple access points (representation, expression, and engagement) for learners, students have the ability to use assistive features to promote individual learning (Roblyer & Hughes, 2019). As a result, technology and digital technology have had dramatic influence on UDL and special education. Technology and digital technology tools allow for greater access and in diverse manners, from oral, visual, to motor skills support (Dikusar, 2018). With the large number of special education students, a wide variety of differentiated supports are needed.

Education Technology Analysis for Special Education Students

In the following examples, popular education technology tools will be referenced to show their possible ineffectiveness with special education student's needs. This analysis is not a critique of the digital technology tools, as no tool can be effective for all learners. Rather, the purpose is to highlight how mainstream tools may not always be effective for all students and that embracing UDL framed instructional design may provide greater access to all students, including special education students. As a result, three popular education technology applications for elementary students will be reviewed: Typing Club, Raz Kids, and IXL Math.

Example 1: Typing Club



Typing Club is a website application that allows users of all levels to learn and master typing on traditional keyboards. This application is used in a variety of school districts within the Chicagoland area as well as international. It offers a very simple, clean, and user friendly interface. For mainstream students it offers all the basic essentials: lessons, feedback, progress, and rewards. However, one challenge from a user experience level includes the integration of stars and points, which lowers intrinsic motivation (Hanus & Fox, 2015).

For special education students, this software may provide little support. As the colors are neutral, the lack of contrast may be a challenge for some visual challenged learners.

Additionally, all instruction is for mainstream keyboards which might not be suitable for all learners. There is no audio support for those who may not be able to hear but still want to engage in typing. Additionally, there were also no magnification or font size customization.

While the understanding of this free website is to be able to provide services to the larger mainstream population, developing additional supports can increase their target audience and meet the needs of today's diverse learners.

Example 2: Raz Kids



Raz Kids is a very straight forward, simple, yet effective reading and comprehension application. This application works on the iPad and iPhone. It allows users to select a digital book, listen to the book, read the book, and or take a comprehension quiz. Afterwards, students earn points and can redeem them through a digital avatar. Its primary feature is its ability to offer books at different lexical levels. It also offers oral support, reading of the text, and access to a dictionary. While this is one of the most popular reading application, it has done little to keep up with current applications. It has a limited and somewhat outdated library, no content adaptation, no learner adaptation or personalization, and on old interface.

From a special education perspective, the lexical level and oral support are its best features. Since it is used on an iPad, it does allow for touchscreen features such as turning the page, highlighting a word, and selecting an answer on the quiz. While it allows for text to speech, it does not allow for speech to text, for its open ended response questions. With its oral support feature, it should allow for increasing or decreasing the speed of the speech as well as adjusting for tonal differences. Screen magnification would also be a simple and possibly useful additional feature. The use of gamification is mild but should also be changed from points and avatar rewards to ones that do not decrease long term engagement.

Example 1: IXL Math



The screenshot shows the IXL Math website interface. At the top, there is a search bar with the text "Search topics and skills" and a search icon. Below the search bar is a navigation menu with links for "MATH", "LANGUAGE ARTS", "REPORTS", "ROSTER", "AWARDS", "STANDARDS", and "MEMBERSHIP". The current page is identified as "Kindergarten > D.8 Number lines - up to 20". The main content area displays a math problem: "Type the missing number." Below the text is a number line with arrows at both ends. The number line has tick marks labeled 15, 16, 17, and 19. There is an empty rectangular box between the tick marks for 17 and 19. At the bottom of the problem area is a green "Submit" button.

IXL Math is designed as a supplemental math instructional tool. It offers no direct instruction of concepts or reviews. It provides simple assessments in all levels of math from early elementary to middle school. It is a website based application but also has applications for mobile devices that function in a very similar manner. IXL's focus is on low cost and accessibility and it accomplishes that well. One of its strongest features is the ability to adapt progressively, advancing quickly for students that quickly understand the concepts. For students who have a strong understanding of the concepts and excel autonomously, this application is a nice supplement. On the positive side it has no gamification elements that can cause challenges, though it also has no engagement strategies of any kind either.

For students who have cognitive challenges this application offers little to no support. While it provides feedback when the response is incorrect, with some rationales, it has little in the way of assistance. There is no tutorials, no summaries, and no audio or supplemental visual support. It is one of the most minimal functioning applications.

Support Summary

As technology and digital technology advances, there are countless solutions to provide all learners with greater access to knowledge and skills. Looking at today's technologies, these supports can assist learners from physical augmentation to cognitive adaptation. Some supports include content adaptation (e.g. font size increases, color changes), sensory adaptation (e.g. oral support, speech to text), motor skills adaptation (e.g. digital braille, differentiated keyboards, joysticks), and physical augmentation (e.g. writing implements) (Dikusar, 2018). Any technology that can directly or indirectly assist learners is a form of support and perhaps augmentation. Some of these supports are physical while others are digital. The examples provided are fairly straight forward. However, there are many aspects within the design of the

digital tools that can be looked at to better enhance learner's needs. A critical element currently under study is that of gamification. With empirical research showing the negative effect of many gamification elements on learning, despite popular belief of educators and academics, changing these design elements can better support academics, behaviors, and emotions (Toda, Valle, & Isotani, 2018). Some elements include the removal of leaderboards, badges, and points systems (Toda, Valle, & Isotani, 2018). It is necessary to provide an experience that not only engages users, provides academic benefits, but also provides a healthy, intrinsically motivated learning experience (Hanus & Fox, 2015).

Conclusion

As technologies and digital technologies gain greater capacity, offering enhanced tools (or their designs) for a wider and more diverse set of learners may not be a corporation's primary concerns, it should be the focus of education policy and that of instructional design and technology educators. With the ever growing number of special education students and even mainstream diverse learners, it is necessary to offer tools that meet a variety of needs from physical, behavioral, cognitive, and even to emotional. With open source coding, it is more than possible to develop best practice toolkits to incorporate within technologies. Imagine a free speech to text tool that can easily be added to any content area. Support from education policy, associations, research, and educators are also needed. Otherwise, special education will not meet its objectives in providing an equal and meaningful education experience for all students. Then it becomes a social justice issue and one with negative social, cultural, and economic effects.

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