CURRICULUM AND TECHNOLOGY: TODAY AND TOMORROW

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SAMR Model

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REDEFINITION
Technology allows for the creation of new tasks, previously inconceivable

MODIFICATION
Technology allows for significant task redesign

AUGMENTATION
Technology acts as a direct tool substitute, with functional improvements

SUBSTITUTION
Technology acts as a direct tool substitute with no functional change

MODEL DEVELOPED BY DR. RUBEN PUENTEDURA

PRIMARY SCHOOL

"TECHNOLOGY CAN BECOME THE “WINGS” THAT WILL ALLOW THE EDUCATIONAL WORLD TO FLY FARTHER AND FASTER THAN EVER BEFORE—IF WE WILL ALLOW IT." - JENNY ARLEDGE

USING THE SAMR MODEL TO INTEGRATE TECHNOLOGIES IN FOUR MAJOR SUBJECT AREAS

- SAMR allows teachers to evaluate how they are using technology
- SAMR forces educators to view technology as part of a strategy to achieve improved learning outcomes
- SAMR forces educators to see themselves as central to the effective use of technology in the classroom

SCIENCE

SCIENCE: GLACIERS	Research and present information on glaciers.	Explore glaciers virtually and interview glacier explorers to obtain a better understanding of glacier geology.
REDEFINITION Introduce tasks that are inconceivable without the technology.		Students explore glaciers with **Google** Expeditions, then create and conduct an interview with a glacier scientist or geologist via Skype Education **.**
MODIFICATION Technology allows for significant task redesign.	Design a presentation poster using Glogster and have students interact online by posting comments. Embed onto a **blog** or **wiki**.	
AUGMENTATION Technology is a substitute with functional improvements.	Create a presentation using **Microsoft PowerPoint** including embedded images and hyperlinks.	
SUBSTITUTION Technology is a substitute with no functional change.	Typing the assignment on **Microsoft Word** rather than written by hand.	

HISTORY

HISTORY: PROHIBITION	Research and report on the causes and effects of prohibition.	Determine what was the impact of prohibition on American society.
REDEFINITION Introduce tasks that are inconceivable without the technology.		Create and interactive timeline using readwritethink, and use Story Creator to create digital stories for timeline entries.
MODIFICATION Technology allows for significant task redesign.	Create a timeline and post to kidblog to interact with peers and teacher online.	
AUGMENTATION Technology is a substitute with functional improvements.	Use timerime to create a timeline including video and images of prohibition.	
SUBSTITUTION Technology is a substitute with no functional change.	Find prohibition images **online** and create a timeline of events.	

LANGUAGE ARTS

LANGUAGE ARTS: CREATIVE WRITING	Students write a story using narrative style.	Students collaborate to compose a story using social media for children.
REDEFINITION Introduce tasks that are inconceivable without the technology.		Students use Scuttlepad online to collaboratively compose a story. Students create characters, plot, and narration. All editing is done online. The final product is published online.
MODIFICATION Technology allows for significant task redesign.	Students collaborate to create a story that integrates multimedia tools like Flipbook.	
AUGMENTATION Technology is a substitute with functional improvements.	Apply some of the tools in **Microsoft Word** such as spellcheck and thesaurus.	
SUBSTITUTION Technology is a substitute with no functional change.	Typing the assignment on **Microsoft Word** rather than written by hand.	

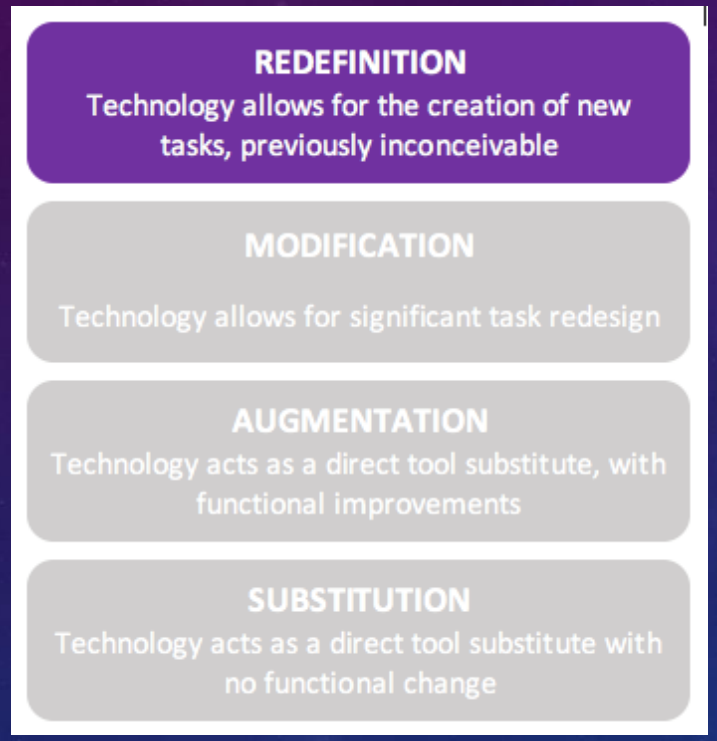
MATH

MATH: FRACTIONS	Demonstrate an understanding of fractions by coloring in the blocks.	Determine your own strengths, weaknesses and proficiency level in fractions.
REDEFINITION Introduce tasks that are inconceivable without the technology.		Students use Dreambox, an adaptive learning math program that maximizes the challenge to each student and presents unique problems to each student according to their own strengths and abilities.
MODIFICATION Technology allows for significant task redesign.	Students use Adapted Mind online fraction tutorials and use **Google Sheets** to create their own fraction worksheets.	
AUGMENTATION Technology is a substitute with functional improvements.	Students use Google Sheets to color in the blocks and teacher provides feedback directly via Google Sheets.	
SUBSTITUTION Technology is a substitute with no functional change.	Students use **MS Excel** to color in the blocks.	

SECONDARY EDUCATION

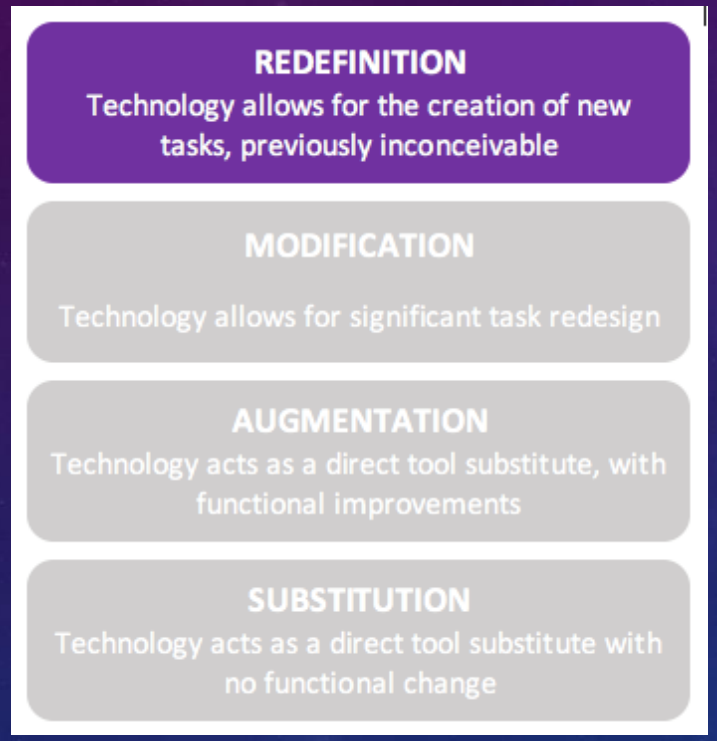
“Technology ushers in fundamental structural changes that can be integral to achieving significant improvements in productivity. Used to support both teaching and learning, technology infuses classrooms with digital learning tools, such as computers and hand held devices; expands course offerings, experiences, and learning materials; supports learning 24 hours a day, 7 days a week; builds 21st century skills; increases student engagement and motivation; and accelerates learning. Technology also has the power to transform teaching by ushering in a new model of connected teaching. This model links teachers to their students and to professional content, resources, and systems to help them improve their own instruction and personalize learning.” (U.S. Department of Education, n.d.)

GOOGLE EARTH



- Geographic Information Systems (GIS)
- Visit locations you couldn't possibly travel to as a class
- According to WestEd (n.d):
  - Study natural and political maps
  - Learn map reading and navigation
  - Create models
  - Go on virtual tours (download or create)
- Demirci, Karaburun, & Kilar (2013) found Google Earth to be an effective educational tool for geography lessons
- Other sites and games based on Google Earth
  - GeoGuessr: https://geoguessr.com/

3D PRINTING



- Create items never before conceived
- Common tool in a Makerspace
- Thingiverse: http://www.thingiverse.com/
- "3D printing puts significant capability into the hands of students, allowing them to answer complex and open-ended questions and demonstrate those answers in three dimensions" (Educause, 2012).
- Modeling software
- Great for PBLs, ELLs (Hitner, 2016)

30 YEARS

3D printers have actually been around for about 30 years. Barriers like cost are breaking down, so they're now becoming available to the public.

Printed objects can be incredibly intricate. They can also be created with working components, hinges, and parts within parts.

REVOLUTIONIZING *the* CLASSROOM

Biology students can study cross-sections of hearts or other organs.

Chemistry students could print out molecules to study.

Auto class students could print replacement or modified car parts.

Cooking class students could design intricate molds for ices and gelatins.

Students in geography courses could print out maps showing the topography, population or demographics of an area.

3D printing has caught the attention of educators who are looking into ways to incorporate it into the classroom.

Using 3D printers in the classroom could mean:

Engineering and design students can print out prototypes of their creations.

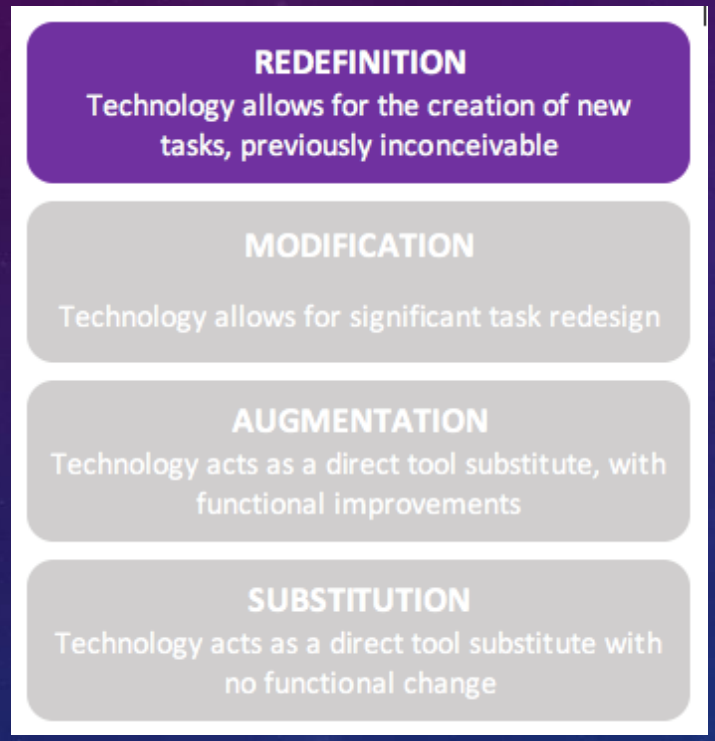
Architecture students could easily print out 3D models of their designs.

History classes could print out historic artifacts for closer examination.

Graphic design students could create 3D versions of their artwork.

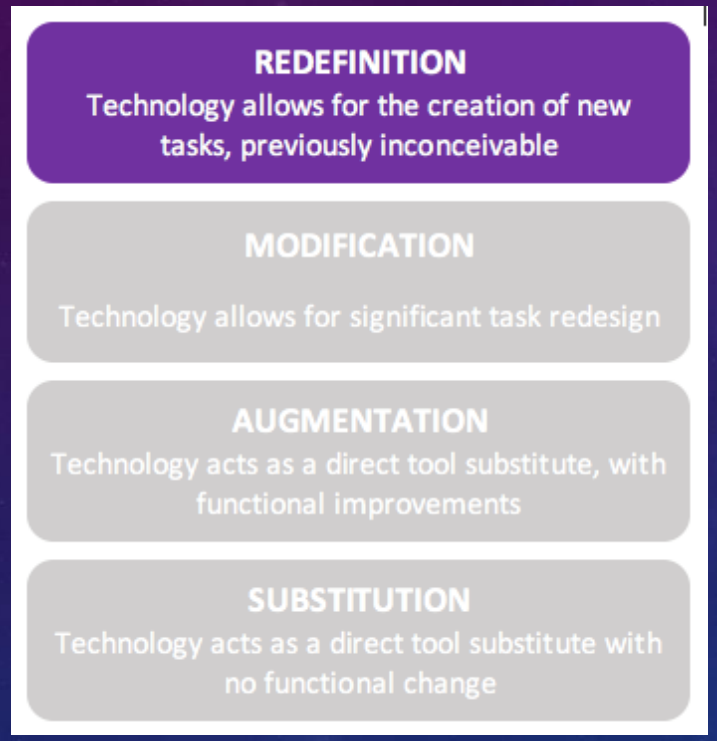
http://www.teachthought.com/the-future-of-learning/technology/10-ways-3d-printing-can-be-used-in-education/

MINECRAFT



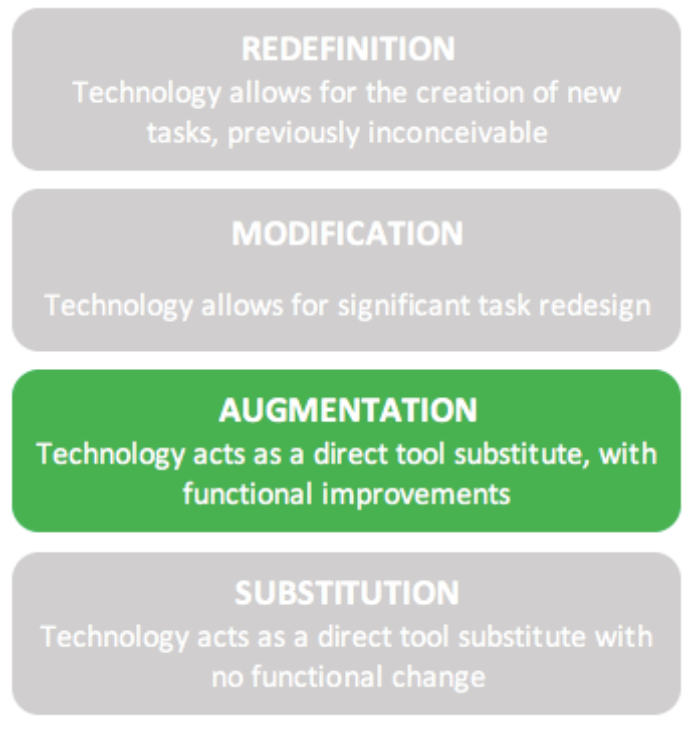
- Game-based learning
- Engineering and modeling
- Applicable to many content areas (Higgin, 2016):
  - Create a sustainable world
  - Make circuits
  - Forms of Government
- "…Minecraft is mobilized as an excellent tool that decentralizes instruction, encourages students' creativity, facilitates collaboration in class, allows for cross-classroom and cross-curricular teaching, addresses some of the needs of diverse students and students who have experienced prior school struggles and may potentially even have therapeutic values for students with learning disabilities" (Petrov, 2014).

SKYPE



- Web-conferencing
- Virtual Field Trips
- Visiting places not possible otherwise
  - Royal Tyrrell Museum, Alberta, CA: http://www.tyrrellmuseum.com/programs/distance/the_royal_tyrrell_museum_virtual_visit.htm
- Collaborate with students and classrooms across the globe
- "Connecting students from different places and backgrounds is a more personal and interesting way for them to learn about the world beyond their own community than reading a chapter in a textbook. Where the best option available for making those connections was once writing to penpals, Skype makes it possible to make the conversations more direct" (Hicks, 2015).

SWIVL

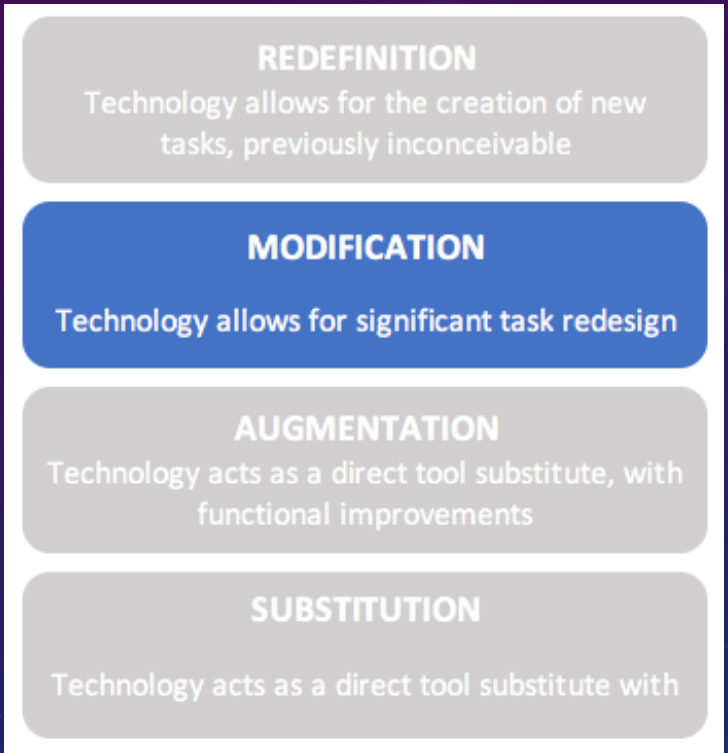


- Video-recording
- Allows students to be independent when recording
- Record, critique, reflect
- Device alone is Substitution, but can be applied to many more uses
- Teacher use vs. student use (Patel, 2014)
  - Phys Ed (Walsh, 2015)
- Hybrid/blended learning, flipped classrooms
- Students as active learners (Kannan & Munday, 2014)

HIGHER EDUCATION

“THE NUMBER ONE PARADOX IN HIGHER EDUCATION IS THAT TECHNOLOGY IS BOTH TRANSFORMING AND DISRUPTING UNIVERSITIES AROUND THE WORLD.” (LUCAS, 2016).

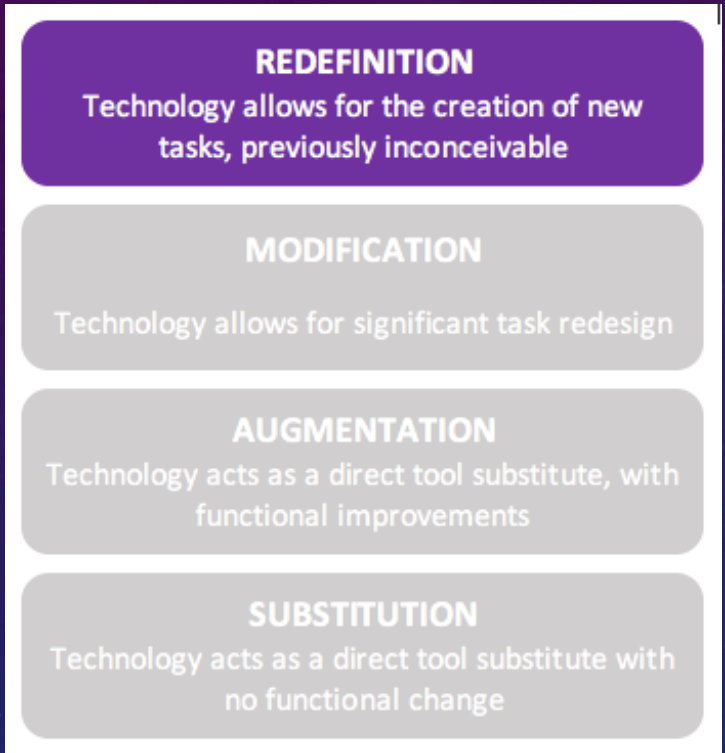
ADAPTIVE PLACEMENT TESTING



- Traditionally, freshmen take placement tests to enroll in developmental or college level courses
- Harper College has students complete an adaptive program, which refreshes and reteaches concepts, then placement test
- Placement in college level math courses up from 45.8% prior to the program start, to 74.5% currently

(Levin, 2016)

SIMULATION

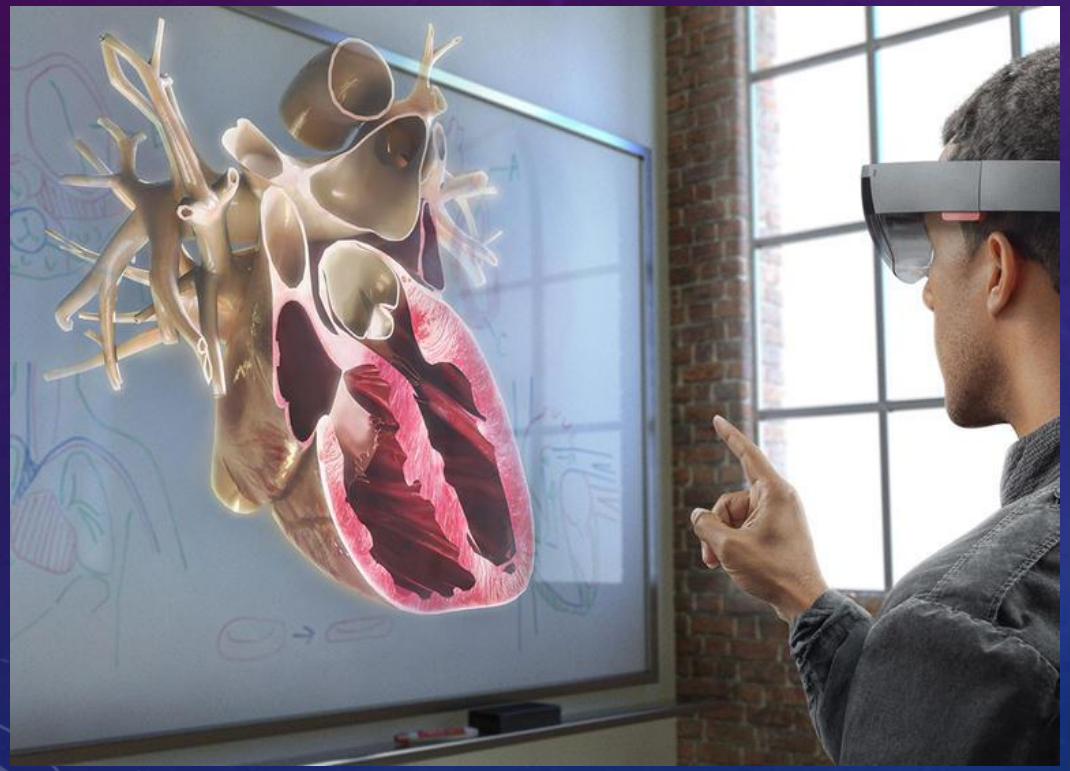


- Traditional simulation enhanced by holographic technology
- Case Western Reserve students learn Human Anatomy with Microsoft HoloLens
- MediSIM pairs HoloLens with a physical simulator to conduct an actual physical assessment and look at the organs below

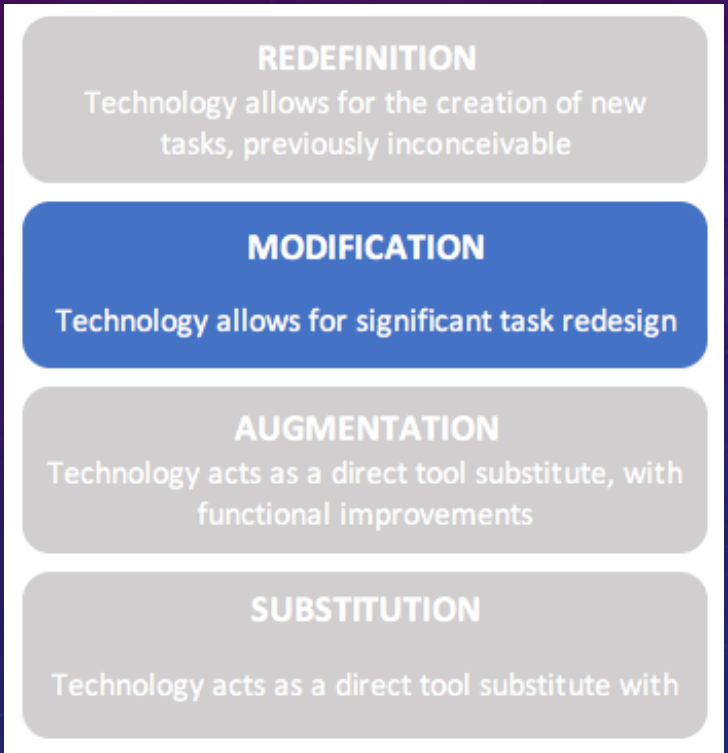
(Microsoft HoloLens, 2017; MediSIM, 2017)

Microsoft HoloLens

MediSIM

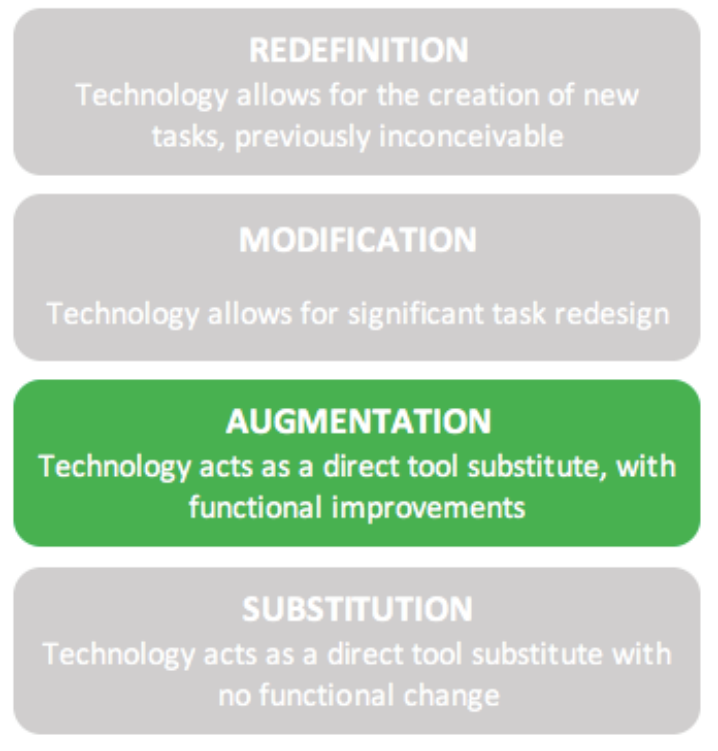


FLIPPED CLASSROOM



- According to Ramsey Musallam, flipped teaching is “leveraging technology to appropriately pair the learning activity with the learning environment.” (Tucker, 2012)
- Focus on transforming students from consumers to producers
- In a study by McGraw-Hill Education, 96% of teachers who have tried a flipped classroom would recommend it to other teachers (Kirby, 2015)

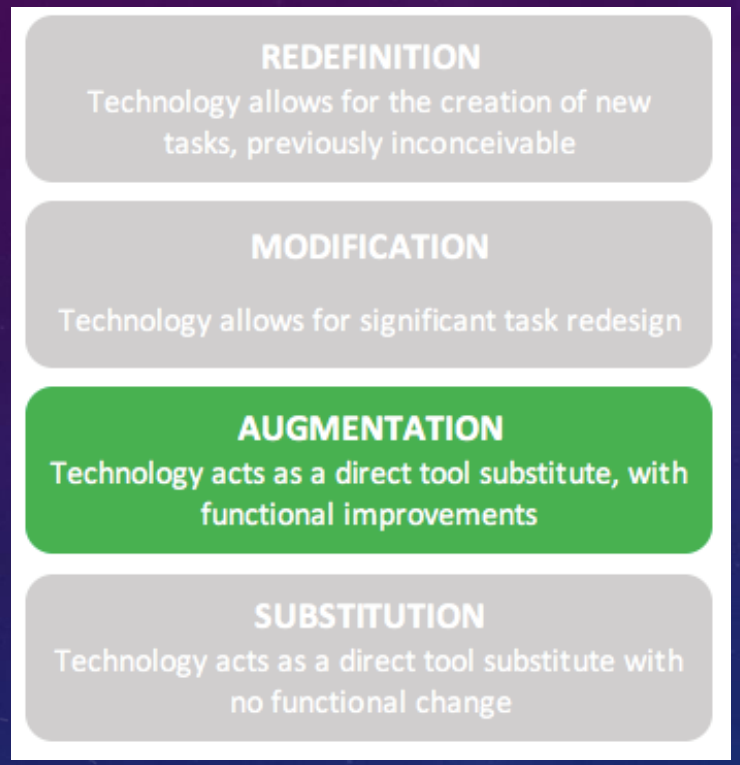
OPEN EDUCATIONAL RESOURCES



- The Open SUNY Textbook project is offering support to faculty creating new open source materials, and locating, adapting and remixing existing materials
- University of Hawaii has a Textbook Zero initiative, working with all of its campuses to adopt no cost textbooks. They use the Pressbooks platform to adapt and author open source materials

(SUNY, n.d.; Watkins, 2017)

MASSIVE ONLINE DEGREES



- Georgia Institute of Technology launched an online master's degree in computer science on the Udacity platform.
- Arizona State University has created Global Freshman Academy on the edX platform, offering a full freshman year of General Education courses.
- MIT is offering a Master's of Engineering in Logistics partially on Coursera. Students complete half the program on the MOOC platform, then may move on to the residential program at MIT.

(Rybard, 2013; Straumsheim, 2015a; Straumsheim, 2015b)

SPECIAL EDUCATION-EXCEPTIONAL STUDENTS

"FOR PEOPLE WITH DISABILITIES, TECHNOLOGY MAKES THINGS EASIER. FOR PEOPLE WITH DISABILITIES, TECHNOLOGY MAKES THINGS POSSIBLE.” (IBM) TRAINING MANUAL ,1991 .

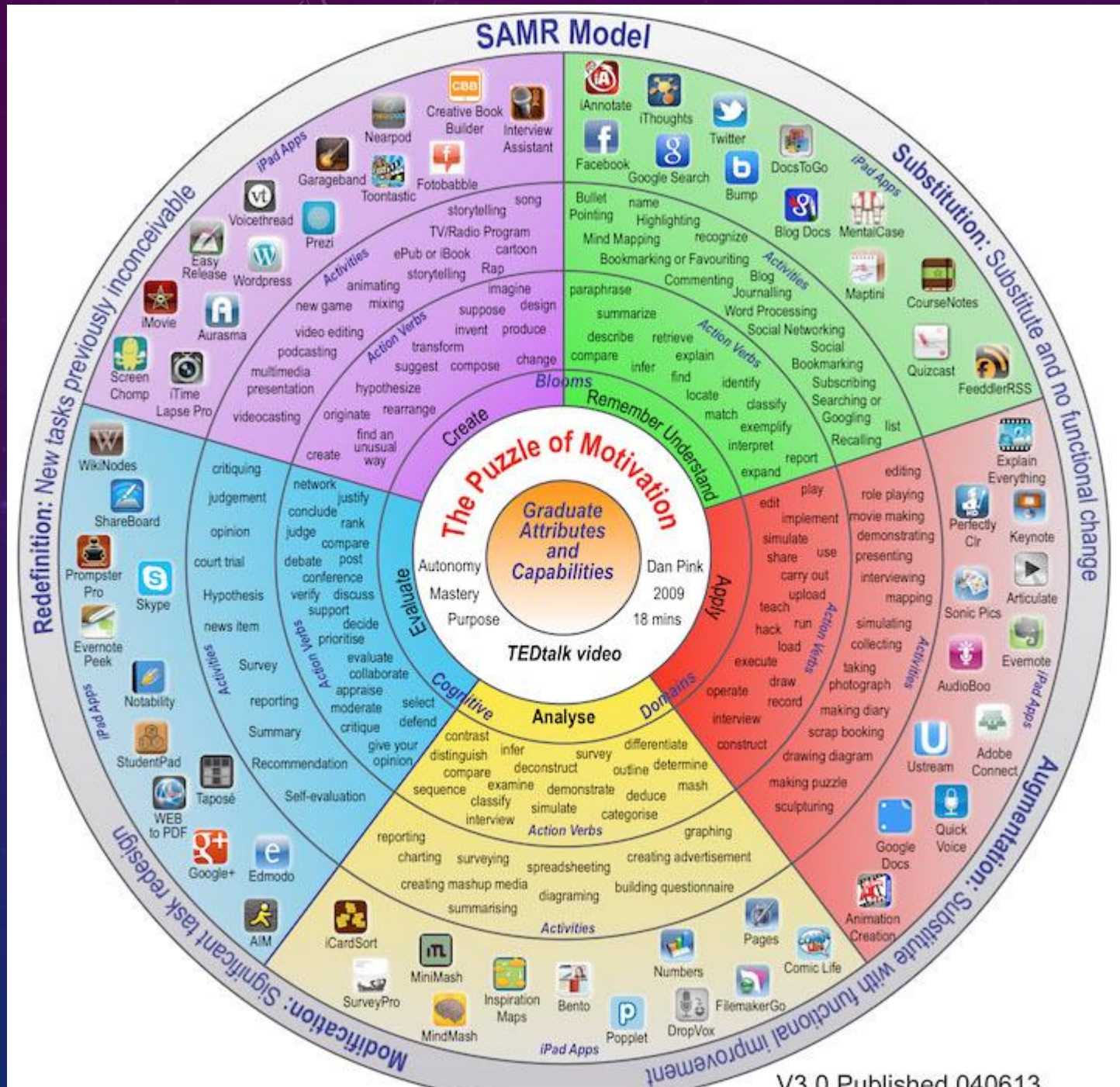
SPECIAL EDUCATION AND EDUCATIONAL TECHNOLOGY # OF US SE STUDENTS RISEN 30% IN LAST DECADE TECHNOLOGY IS LEVELING THE PLAYING FIELD

- **Advantages to Students:** Technology has had multiple benefits to help students with special-needs navigate the world around them. Special-needs students who use technology (including but not limited to assistive technology) on a daily basis learn to better self-advocate, gain confidence, challenge themselves; and achieve greater levels of independence.
- **Advantage to Teachers:** Personalize lessons and skill enhancement for each child

(J. Roland, ISTE Journal, How Special Education Technology Improves Learning)

- **Technological Support:** Students have access to the use of computers which include specialized software such as text-to speech, speech-to text, grammar checks, study skills and note-taking programs. For many students with learning disabilities, audiobooks can be an invaluable aid in increasing reading speed and comprehension.

(Heather B. Haynes, Ed Tech Magazine)



V3.0 Published 040613

Transforming the Lives of Special Education Students With 65 examples of educational technology tools and applications

EDUCATING EXCEPTIONAL CHILDREN- SUBSTITUTION

Tool used for those with learning disabilities and/or are visual learners.
Helps them to organize their thoughts and ideas digitally via a ‘MindMap.’

I thoughts - SUBSTITUTION

Acts as a direct tool substitute with no functional change

EDUCATING EXCEPTIONAL CHILDREN- AUGMENTATION

In a speech class have students practice language and pronunciation skills and playback to listen to their progress

Augmentation

Acts as a direct tool substitute with functional Improvement

EDUCATING EXCEPTIONAL CHILDREN- MODIFICATION – TECH ALLOWS FOR SIGNIFICANT TASK REDESIGN

Speak It! Text-to speech app available on iTunes which reads allowed any text that you copy and paste into it's program. Helps those especially who are nonverbal.

Sources: https://itunes.apple.com/us/app/speak-it!-text-to-speech/id308629295?mt=8

Speak It - Modification

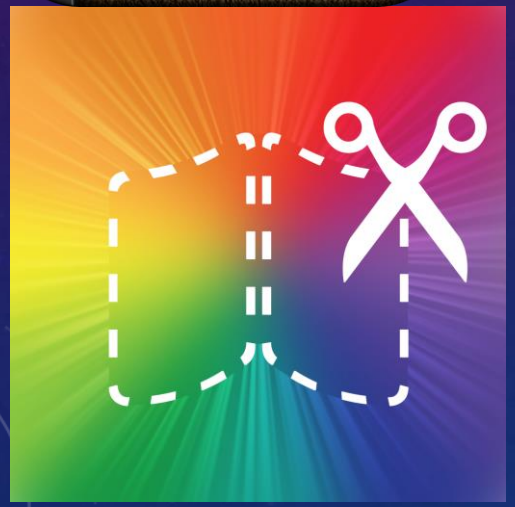
Dragon Dictation
Those who struggle with Dysgraphia and other writing disabilities can use this program to put their words down on paper without having to write it out by hand.
Sources: National Form Of Special Education Journal, Volume 25, Number 1, 2014
http://www.nationalforum.com/Electronic%20Journal%20Volumes/McCollum, %20Dixie%20Effects%20of%20a%20Speech-to-Text%20Software%20NFSEJ%20V25%20N1%202014.pdf

Dragon Diction - Modification

EDUCATING EXCEPTIONAL CHILDREN-REDEFINITION-

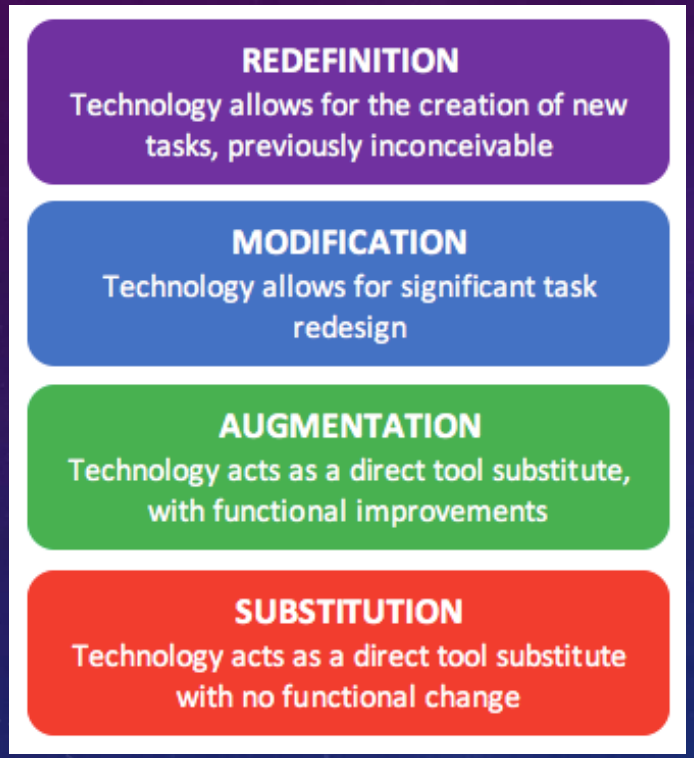
ALLOWS FOR CREATION OF NEW TASKS PREVIOUSLY INCONCEIVABLE

Pictello
Provides visuals for day to day activities which can include social stories and visual schedules for those with a wide range of special needs.
Developed by a Speech-Language Pathologist named Jennifer Marden.
Sources: http://www.specialneeds.com/products-and-services/general-special-needs/special-needs-app-day-pictello



Book Creator
An App created for Ipads that can help build on communication, literacy and numerical skills. Students speak into the device and get to hear their voices as they create their own stories.
Sources: http://bookcreator.com/blog/2013/11/book-creator-breaking-boundaries-special-education-2/
ok Creator

THE SAMR MODEL



- Easy for teachers to understand, and try to reach higher levels of implementation
- Lack of theoretical basis; very little peer-reviewed literature
- Lack of acknowledgement of the importance of context
- Model is rigid, may not focus enough on learning
- Focuses on product, not process
- Higher levels may not lead to better outcomes, more research is required

(Hamilton, Rosenberg and Akcaoglu, 2016)

PRIMARY RESOURCES

Dumancic, M., & Matijevic, M. (2016). How mobile learning can change education. *Online International Interdisciplinary Research Journal, Volume-VI*.

Domingo, M., & Gargante, A. B. (2016). Exploring the use of educational technology in primary education: teachers' perception of mobile technology learning impacts and applications' use in classroom. *Computers in Human Behavior, 56*, 21-28.

EdofICTJSSALC. SAMR Examples. Retrieved from: https://edofict.wikispaces.com/SAMR+Examples

Hilton, J. T. (2016). A case study of the application of SAMR and TPACK for reflection on technology integration into two social studies classrooms. *Social Studies, 107(2)*, 68-73.

Pitchford, N. J., & Outhwaite, L. A. (2016). Can touch screen tablets be used to assess cognitive and motor skills in early years primary school children? A cross cultural study. *Frontiers in Psychology, Volume 7*.

Pruet, P., Ang, C. S., & Farzin, D. (2016). Understanding tablet computer usage among primary school students in underdeveloped areas: Students' technology experience, learning styles and attitudes. *Computers in Human Behavior, 55,* 1131-1144.

Walsh, K. (2015). 8 examples of transforming lessons through the SAMR cycle. Emerging Ed Tech. Retrieved from: http://www.emergingedtech.com/2015/04/examples-of-transforming-lessons-through-samr/

SECONDARY EDUCATION REFERENCES

- Demirci, A., Karaburun, A., & Kılar, H. (2013). Using Google Earth as an educational tool in secondary school geography lessons. *International Research in Geographical and Environmental Education*, *22*(4), 277-290.
- Educause. (2012, July). Things You Should Know About…3D Printing. Retrieved from https://library.educause.edu/~/media/files/library/2012/7/eli7086-pdf.pdf
- Hicks, K. (2015, May 9). 6 Creative Ways to Use Skype in the Classroom. *Edudemic*. Retrieved from http://www.edudemic.com/skype-in-classroom/
- Higgin, T. (2016, April 13). Great Minecraft Lesson Plans. *Common Sense Education*. Retrieved from https://www.commonsense.org/education/blog/great-minecraft-lesson-plans
- Hitner, M. (2016, April 27). 3D Printing in Education: Beyond STEM. *MatterHackers*. Retrieved from https://www.matterhackers.com/articles/3d-printing-in-education-beyond-stem
- Kannan, J., & Munday, P. (2014). Student Created Videos in a Spanish Language Course: Promoting Active Learning.

SECONDARY EDUCATION REFERENCES (CONTINUED)

- Patel, A. (2014, December 26). 15 Uses for the Swivl. The CoolCatTeacher Blog. Retrieved from http://www.coolcatteacher.com/15-uses-swivl/?nabe=6224726523641856:1&utm_referrer=https%3A%2F%2Fwww.google.com%2F
- Petrov, A. (2014). *Using Minecraft in Education: A Qualitative Study on Benefits and Challenges of Game-Based Education* (Doctoral dissertation, University of Toronto).
- U.S. Department of Education. (n.d.). Use of Technology in Teaching and Learning. Retrieved from https://www.ed.gov/oii-news/use-technology-teaching-and-learning
- Walsh, K. (2015). 8 Examples of Transforming Lessons Through the SAMR Cycle. EmergingEdTech. Retrieved from http://www.emergingedtech.com/2015/04/examples-of-transforming-lessons-through-samr/
- WestEd. (n.d.). Google Earth in the Classroom. Retrieved from https://static.googleusercontent.com/media/www.google.com/en//educators/activities/pdfs_GTA/CribSheet.Earth5.pdf

HIGHER EDUCATION REFERENCES

Kirby, L. (2015). Think flipping the classroom Isn't for you? Check out the hard data before making any decisions. Retrieved from http://www.mheducation.com/highered/ideas/educator/think-flipping-the-classroom-isnt-for-you-check-out-the-hard-data-before-making-any-decisions.html

Levin, D. (2016). Five reasons to value technology in higher education. Retrieved from https://www.linkedin.com/pulse/five-reasons-value-technology-higher-education-david-levin

Lucas, H. (2016). The higher education technology paradox. Retrieved from http://www.edtechmagazine.com/higher/article/2016/05/higher-education-technology-paradox

MediSIM (2017). MediSIM. Retrieved from http://www.etc.cmu.edu/projects/medisim/

Microsoft HoloLens (2017). Microsoft HoloLens: Partner spotlight with Case Western Reserve University (video). Retrieved from https://www.youtube.com/watch?v=SKpKlh1-en0

Rybard, R. (2013) Massive (but not open). Retrieved from https://www.insidehighered.com/news/2013/05/14/georgia-tech-and-udacity-roll-out-massive-new-low-cost-degree-program#sthash.vL7pJ7SD.dpbs

HIGHER EDUCATION REFERENCES (CONTINUED)

Straumsheim, C. (2015a). MOOCs for (a year's) credit. Retrieved from https://www.insidehighered.com/news/2015/04/23/arizona-state-edx-team-offer-freshman-year-online-through-moocs

Straumsheim, C. (2015b). MIT's new model. Retrieved from https://www.insidehighered.com/news/2015/10/08/massachusetts-institute-technology-launch-half-mooc-half-person-masters-degree

SUNY Open Educational Resources Services (n.d.) Retrieved from http://textbooks.opensuny.org/suny-oer-services/

Tucker, C. (2012). Flipped classroom: Beyond the videos. Retrieved from http://catlintucker.com/2012/04/flipped-classroom-beyond-the-videos/

Watkins, D. (2017) How the University of Hawaii is solving today's higher ed problems. Retrieved from https://opensource.com/article/17/2/interview-education-billy-meinke

EDUCATIONAL RESOURCES FOR SPECIAL EDUCATION

Assistive Technology: A Parent's Guide, IBM Training Guide, 1991, retrieved from http://www.disabilityrightsca.org/pubs/Assistive_Technology_Parents_Guide.pdf

IDEA / Special Education retrieved from http://www.nea.org/specialed

Marden, Jennifer, retrieved from http://www.specialneeds.com/products-and-services/general-special-needs/special-needs-app-day-pictello

Marunczpn, Mathieu, Bookcreator: Breaking boundaries in Special Education, 27 November, 2013 http://bookcreator.com/blog/2013/11/book-creator-breaking-boundaries-special-education-2/

Educational Resources for Special Education

Mc McCollum, Dixie, Nation, Steven, Gunn Sharon, The Effects of Speech to Text Software Application on Expression for Students with Various Disabilities, National Forum of Special Education Journal Volume 25, Number 1, 2014 retrieved from http://www.nationalforum.com/Electronic%20Journal%20Volumes/McCollum,%20Dixie%20Effects%20of%20a%20Speech-to-Text%20Software%20NFSEJ%20V25%20N1%202014.

Nieves, Kathyrn, Empowering Special Education Students Thru Technology, Edutopia, retrieved from https://www.edutopia.org/article/empowering-special-education-students-technology-kathryn-nieves

Roland. ISTE Journal, How Special Education Technology Improves Learning 10/7/2015,https://www.iste.org/explore/articleDetail?articleid=568
Shrock, Kathy, The Guide to Everything retrieved from http://www.schrockguide.net/samr.html

Educational Resources for Special Education

Speak It Text to Speech, https://itunes.apple.com/us/app/speak-it!-text-to-speech/id308629295?mt=8

The Padagogy Wheel, http://www.teachthought.com/uncategorized/the-padagogy-wheel-convergent-thinking-in-learning-technology/#Retrived from the Technology Resource Center of Marin

Zorigan, Kris and Job, Jennifer, How do Special education Students benefit from Technology? Retrieved from http://learjnnc.org/lp/pages6917Learn NC

SAMR REFERENCES

Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. (2016). The substitution augmentation modification redefinition (SAMR) model: A critical review and suggestions for its use. *TechTrends, 60*(5), 433-441. doi:http://dx.doi.org/10.1007/s11528-016-0091-y

Puentedura, R. (2014a). Building transformation: An introduction to the SAMR model [Blog post]. Retrieved from http://www.hippasus. com/rrpweblog/archives/2014/08/22/BuildingTransformation_AnIntroductionToSAMR.pdf.