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How Manipulatives in the Classroom Engage Students in Learning

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How Manipulatives in the Classroom Engage Students in Learning

A Thesis in the Field of Education

for the Degree of Master of Science in Education

Art of Teaching Program

SARAH LAWRENCE COLLEGE

Catherine Mackenzie Mindish

May 2021

Abstract

The use of manipulatives inside the classroom at any age benefits the students in a variety of ways. This research examined different lesson plans, professional literature, and discussions on both the benefits and challenges of teaching with manipulatives. Ultimately this study finds that manipulatives benefit students, by supporting the development of skills they will use inside and outside of the classroom. Additionally, because manipulatives foster engagement in the learning process, teachers will reap additional benefits and students develop a positive attitude toward learning.

Acknowledgement/Dedication

I would like to express my special thanks of gratitude to my wonderful professors Patricia Virella, Denisha Jones and Jerusha Beckerman who gave me constant guidance for conducting this project.

Jerusha was someone who constantly answered my emails about resources and supported me when I needed it most throughout this process. Denisha was someone who offered a great amount of assistance by helping me develop my broad idea into a specific topic, and start my research. Patricia played a major role in completing this project, she did this by providing me with encouragement and patience when I was overwhelmed, and helping me organize my thoughts in a clear and concise way for my audience to understand.

Lastly, I would like to thank my Mom and my Aunt Lynn for letting me discuss my topic with them non stop, and bounce my ideas off of each other. I would also like to thank my Aunt Lynn for giving me insight to a classroom, and giving me a different perspective on ways to teach with manipulatives inside the classroom.

Annotated Outline

How Manipulatives In The Classroom Engage Students In Learning

1. Introduction
 - a. Discuss what happens when manipulatives are used in the classroom
 - b. Take my audience back to a classroom where no manipulatives were used

2. Benefits of Manipulatives
 - a. “Manipulatives help students learn by allowing them to move from concrete experiences to abstract reasoning.” (Heddens, 1986, Reisman, 1982; Ross and Kurtz, 1993)
 - B. Able to use them in multiple ways and every subject
 - C. Reflecting on my own experience through school & how it was easier to learn with manipulatives

3. Why I would Use Manipulatives More
 - a. Engages students in learning
 - b. Gets students excited to learn
 - c. Helps students learn different ways to understand the same material

4. Different types of Manipulatives
 - a. Virtual & Concrete
 - b. Different types of learners
 - c. Focusing on kinesthetic and tactile learning making curriculum more engaging

5. Importance of Virtual Manipulatives
 - a. Starting by doing over a year of school online
 - b. “Students can perform almost any function with a virtual manipulative as they could with a concrete manipulative, such as using tiles to create rectangles and counting them to determine area and perimeter or stacking cubes to determine volume or surface area.” (Bouck & Flannagan, 2009, pg. 187) **Virtual Manipulatives: What they are and how teachers can use them By: Emily C. Bouck And Sara M. Flanagan**

6. What I Would Use Virtual Tools For
 - a. Modeling lessons in the class
 - b. Allows classrooms to run smoothly
 - c. Students learn from each other and teachers learn thinking processes

7. Benefits of Concrete Tools
 - a. Helps relate to the more visual learners

- b. Grasping material better
- c. Relating material to outside world

8. Factors to Remember When Using Manipulatives

- a. Differentiate the lesson
- b. Talk about storage space of tools
- c. Go into example from work this semester as substitute at preschool

9. Why I Would Use Manipulatives

- a. Gets students excited about learning
- b. More interactions
- c. Builds community

10. Why Tools Are Important In Every Subject

- a. Start by being apart of Art Of Teaching Program
- b. Allows students to communicate with each other & teacher
- c. Utilizing them throughout the school day, no matter what subject

11. All Students Should Have the Same Opportunities

- a. More lifelike
- b. More communication in the classroom
- c. Helps create a positive environment

12. Special Education Manipulatives

- a. Future Aspirations
- b. Every classroom deserves these tools
- c. Talk about how effective sensory toys can be
- d. How teachers can help students become successful

13. Benefits of Physical & Virtual

- a. As Burns states in her article 7 Musts for using Manipulatives, “One explanation for this can be attributed to the design of both tools. Concrete manipulatives require teachers to re guide students through the problem solving process once an error occurs, whereas students are provided immediate collective feedback using a virtual program.” Ross, R., & Kurtz, R. (1993). Making manipulatives work: A strategy for success. *The Arithmetic Teacher*, 40(5), 254-257. <https://guides.lib.campbell.edu/c.php?g=325978&p=2667668>
- b. Discuss nonverbal students

14. Different Types of Learners

- a. Different disabilities

- b. Creating opportunities for success
- c. Example of helping a student

15. Student Placement

- a. Discuss Mr. Benros's position in the classroom
- b. Special Education teacher
- c. Treated all students equally
- d. Created positive relationships with students which helps them get excited about learning

16. How I would Support Special Education

- a. Focus on needs of my students
- b. Variety of Virtual and concrete manipulatives
- c. Make sure students are progressing

17. Adjustments that Manipulatives help

- a. Assistive technology
- b. Cognitive skills
- c. Writing Skills
- d. Tactile Opportunities

18. How I Can Incorporate Manipulatives Into the Class

- a. Create a space for success
- b. Visuals
- c. Learning is multisensory
- d. Use of technology

19. Specific Lessons

- a. Quote "Make math as meaningful as possible in everyday interactions. Even simple tasks like counting items as you add them to the grocery cart and counting and rolling coins make math learning more real to your student."
- b. Happy Students
- c. Read from Slide

20. My Pedagogical Practice

- a. Visuals
- b. Example of lesson I would do
- c. Manipulative every lesson (If possible)
- d. Different types of work, (Independent, and group)

21. Teaching Students with Autism

- a. Different levels

- b. Know your student individually
- c. Reassuring that guidance is involved in the classroom

22. What Manipulatives Work More Effectively

- a. Know who your students are
- b. Sensory toys
- c. Read slides

23. Modifications for students with Autism

- a. Visuals to begin instruction
- b. Sensory needs throughout the day
- c. Environment in which students communicate with teacher as well

24. How I Would Teach A Lesson

- a. Constant manipulatives
- b. Interaction
- c. Progress

25. Upper Elementary

- a. Fifth grade placement
- b. Teachers starting to expect more of you
- c. In depth material with manipulatives

26. Lessons that can be Taught

- A. Read Slide
- B. Students excited to play with manipulatives and learn
- C. Emphasize other lessons can use manipulatives too

27. Upper Elementary

- a. Read from slide
- b. Students get a sense of ownership & Encouragement

28. Early Childhood

- a. New surroundings
- b. Make discoveries through play

29. Skills that Manipulatives Teach Children

- a. Read from Slide
- b. Example from work
- c. Emphasize the importance of self discovery

30. Guidelines for Using Manipulatives

- a. Sharing
- b. Don't interrupt other's work
- c. Example from work of students with blocks

31. Looking for Progress

- a. Always make students are progressing
- b. Benefitting from tools around them
- c. How we worked at ECC with parent/teacher conferences

32. How I would Design a Classroom

- a. Create a play based area
- b. Different elements into the class
- c. Make sure all my students know each other
- d. How I would encourage students to think outside the box

33. How I would Support Tina

- a. Sensory emphasisation
- b. Ask questions to encourage thinking
- c. Think of her as an individual
- d. Give example of a time during the day

Quotes

Quotes from Slides:

“Ninety-eight percent of teachers indicated that the use of math manipulatives had a positive impact on increasing student achievement, while 97% indicated they believed the use of manipulatives was vital to student understanding.” (Bandy, 1998, pg. 4)

<https://thekeep.eiu.edu/cgi/viewcontent.cgi?article=2706&context=theses>

“Improves engagement, improves knowledge retention, encourages individual learning, and encourages collaboration.” (Schooljotter, 2003, pg.1)

<https://www.webanywhere.co.uk/blog/2016/02/top-6-benefits-technology-classroom/>

“Over the past four decades, studies done at all different grade levels and in several different countries indicate that mathematics achievement increases when manipulatives are put to good use.” (Canny, 1984; Clements & Battista, 1990; Clements, 1999; Dienes, 1960; Driscoll, 1981; Fennema, 1972, 1973; Skemp, 1987; Sugiyama, 1987; Suydam, 1984) (Hand2mind, 2000, pg. 3)

<https://www.hand2mind.com/resources/benefits-of-manipulatives#:~:text=The%20use%20of%20manipulatives%20helps%20students%20hone%20their%20mathematical%20thinking%20skills.&text=The%20effective%20use%20of%20manipulatives,deep%20understanding%20of%20mathematical%20concepts>

“Virtual Manipulatives have been identified as an “interactive, web based visual representation of a dynamic object that presents opportunities for constructing mathematical knowledge” and are often modeled after concrete manipulatives.” (Intervention in school & clinic, Vol. 45 number 3, pages 186-191, DOI, 10.1177/1053451209349530)

- **Virtual Manipulatives: What they are and how teachers can use them by: Emily Bouck, and Sarah M. Flanagan)**

“Introduction or reviewing material, developing understanding of mathematical concepts by visually representing those that are abstract, scaffolding student learning, actively engaging students in learning. (Intervention in school & clinic, Vol. 45 number 3, pages 186-191, DOI, 10.1177/1053451209349530)

- **Virtual Manipulatives: What they are and how teachers can use them by: Emily Bouck, and Sarah M. Flanagan)**

“Manipulatives, which are hands-on tools for teaching math and other subjects are a great way to reach tactile and visual learners.” (Specialty, 2017, pg. 1)

<https://blog.schoolspecialty.com/benefits-manipulatives-classroom/>

“Manipulatives have been chosen to support the lesson objective.” (Campbell University, 2019, pg. 2)

“Significant plans have been made to orient students to the manipulatives and corresponding classroom procedures.” (Campbell University, 2019, pg.2)

“The lesson involves active participation of each student.” (Campbell University, 2019, pg.2)
<https://guides.lib.campbell.edu/c.php?g=325978&p=266766>

“Although both concrete and virtual manipulatives were shown to be effective for teaching students with varying disabilities, research suggests that virtual manipulatives may present advantages that make them more suitable for some students than a concrete form.” (e.g. Bouck, Satsangi, Doughty & Courtney, 2014; Satsangi, Bouck, Taber-Doughty, Bofferding & Roberts, 2016)

(Rajiv Satsangi & Bridget Miller (2017) The case for adopting virtual manipulatives in mathematics education for students with disabilities. Preventing School Failure; Alternative Education for Children and Youth. 61;4 303-310, DOI, 10.1080/1045988X.2016.1275505)

- **The Case for Adopting Virtual Manipulatives in Mathematics Education for Students with Disabilities By: Rajiv Satsangi & Bridget Miller**

“Evidence based practice in mathematics for students with disabilities has demonstrated the positive impact of concrete manipulatives to support math understanding, however, this study sought to understand how teachers feel about the use of manipulatives with a specific population of students who may find the manipulatives themselves a barrier for learning.” (Physical Disabilities: Education & Related Services, 2017, 36(1), 1-12, DOI:

10.14434/pders/v36i1.22172, Division for Physical, Health and Multiple Disabilities)

- **Math Manipulatives For Students with Severe Intellectual Disability: A Survey of Special Education Teachers By: Bree Ann Jimenez & Carol Stanger**

“Virtual Manipulatives allow students to manipulate and explore mathematical concepts with digital space on computers, tablets, and handheld devices.”

(Rajiv Satsangi & Bridget Miller (2017) The case For Adopting Virtual Manipulatives in Mathematics Education for Students’ with Disabilities. Preventing school Failure; Alternative Education for Children & Youth, 61;4, 303-310, DOI, 10.1080/1045988X.2016.1275505)

- **The Case for Adopting Virtual Manipulatives in Mathematics Education for Students with Disabilities By: Rajiv Satsangi & Bridget Miller**

“Virtual manipulatives provide students with flexible options for learning and greater student autonomy, and offer educators a wider range of options to accommodate diverse groups of students.”

(Rajiv Satsangi & Bridget Miller (2017) The case For Adopting Virtual Manipulatives in Mathematics Education for Students’ with Disabilities. Preventing school Failure; Alternative Education for Children & Youth, 61;4, 303-310, DOI, 10.1080/1045988X.2016.1275505)

- **The Case for Adopting Virtual Manipulatives in Mathematics Education for Students with Disabilities By: Rajiv Satsangi & Bridget Miller**

“Offering students two forms of manipulatives to select from provides teachers with an

opportunity to factor students preference into consideration to avoid such issues.”

(Rajiv Satsangi & Bridget Miller (2017) The case For Adopting Virtual Manipulatives in Mathematics Education for Students’ with Disabilities. Preventing school Failure; Alternative Education for Children & Youth, 61;4, 303-310, DOI, 10.1080/1045988X.2016.1275505

- **The Case for Adopting Virtual Manipulatives in Mathematics Education for Students with Disabilities By: Rajiv Satsangi & Bridget Miller**

“For example, for students with visual impairments, audio prompts and feedback enlarged text and zooming features can be accessed to assist them through a problem-solving process; for students with attention deficit hyperactivity disorder, color options and visual sound effects can be adjusted to meet their needs; for English Language Learners, programs exist offering multilingual options for teachers to purchase.”

(Rajiv Satsangi & Bridget Miller (2017) The case For Adopting Virtual Manipulatives in Mathematics Education for Students’ with Disabilities. Preventing school Failure; Alternative Education for Children & Youth, 61;4, 303-310, DOI, 10.1080/1045988X.2016.1275505

- **The Case for Adopting Virtual Manipulatives in Mathematics Education for Students with Disabilities By: Rajiv Satsangi & Bridget Miller**

“Many children and adults with down syndrome are visual learners and it can be helpful to include supplementary charts and spatial organizers alongside classroom handouts.”

(Readandspell, 2010, pg.3)

<https://www.readandspell.com/us/modifications-for-students-with-Down-syndrome>

“Sign and gesture can support new vocabulary learning and visual scaffolds such as photos as pictures support language learning.” (Bird, 2016, pg.4)

<https://senmagazine.co.uk/content/specific-needs/down-syndrome/1920/helping-children-with-down-s-syndrome-to-learn/>

“Enhanced verbal environments that build semantic and syntactic knowledge help to develop verbal abilities.” (Bird, 2016, pg.4)

<https://senmagazine.co.uk/content/specific-needs/down-syndrome/1920/helping-children-with-down-s-syndrome-to-learn/>

“Some adjustments are straightforward, such as allowing learners to record lessons instead of taking notes, or extending time limits and reducing word count expectations.” (Modifications for students with down syndrome, Readandspell, 2010, pg.3)

<https://www.readandspell.com/us/modifications-for-students-with-Down-syndrome>

“Use your student’s favorite small toys, figurines, or building blocks to enhance number learning. Grouping together multiples of these playthings while pointing to the number on the number line and also saying it aloud helps increase understanding and retention.” (Teaching Math to Students with Down Syndrome, Time4Learning, 2004, pg.1)

<https://www.time4learning.com/homeschooling/special-needs/down-syndrome/teaching-math.html>

“Autism impacts the normal development of the brain in the areas of social interaction, communication skills, and cognitive function.” (National Autism Association, 2003, pg.1) https://nationalautismassociation.org/resources/autism-fact-sheet/?gclid=CjwKCAjwvMqDBhB8EiwA2iSmPNpMOcejVdX9OucyECIYsLDGouF2WzsI_o0zTKNZjbZHJDVl3p3RSxoCu60QAvD_BwE

“Individuals with autism typically have difficulties in verbal and non verbal communication, social interactions and leisure or play activities.” (National Autism Association, 2003, pg.1) https://nationalautismassociation.org/resources/autism-fact-sheet/?gclid=CjwKCAjwvMqDBhB8EiwA2iSmPNpMOcejVdX9OucyECIYsLDGouF2WzsI_o0zTKNZjbZHJDVl3p3RSxoCu60QAvD_BwE

“Sensory toys used for autism can help children focus better, calm down, and relax, however sensory toys do not replace formal and evidence based treatment for autism spectrum disorders.” (10 Best Sensory Toys & Gifts for children with Autism, Autism Center of Learning, Pingree, 2011, pg.1) <https://carmenbpingree.com/blog/best-sensory-toys-for-children-with-autism/>

“In the end, sensory toys are meant to help a child learn more about their senses in a fun way.” (10 Best Sensory Toys & Gifts for children with Autism, Autism Center of Learning, Pingree, 2011, pg.1) <https://carmenbpingree.com/blog/best-sensory-toys-for-children-with-autism/>

“Develop and use visuals for instruction, Evaluate and assess sensory needs and schedule sensory activities throughout the day, Develop and use a communication system across environments.” (20 Classroom Modifications for students with Autism, Autism/Asperger’s Digest, Wright, 2001, pg.3) https://tcsps.sharpschool.net/UserFiles/Servers/Server_981069/File/Migrated%20Documents/20classrm_modifications_for_students_with_autism.pdf

“Students will struggle to have long-term success and will lack flexibility in their thinking if we do not begin with concrete examples first.” (Must-Have Math Manipulatives for Upper Elementary Classrooms, Hege, 2020, pg.1) <https://www.mixandmath.com/blog/must-have-math-manipulatives-for-upper-elementary>

“Place Value(Base ten Blocks) These can be used for developing place value understanding with whole numbers and they can also be used for exploring place value with decimals.” (Must-Have

Math Manipulatives for Upper Elementary Classrooms, Hege, 2020, pg.1)
<https://www.mixandmath.com/blog/must-have-math-manipulatives-for-upper-elementary>

“Operations with whole numbers and decimals (Play Money) “This allows you to get straight to the math and focus on what is actually happening when we begin “Doing things” with numbers!” (Must-Have Math Manipulatives for Upper Elementary Classrooms, Hege, 2020, pg.1)
<https://www.mixandmath.com/blog/must-have-math-manipulatives-for-upper-elementary>

“Educators must carefully and deliberately choose the manipulatives being used as well as the sequence of introducing the manipulatives associated with the development of the mathematical topic being studied to maximize effectiveness.” (Top5 Reasons for Using Manipulatives in the Classroom, Jones, 2019, pg.4)
<https://tljconsultinggroup.com/the-top-5-reasons-for-using-manipulatives-in-the-classroom/>

“Also, studies suggest that mathematics achievement does increase when manipulatives were used over extended periods of time.” (Top5 Reasons for Using Manipulatives in the Classroom, Jones, 2019, pg.4)
<https://tljconsultinggroup.com/the-top-5-reasons-for-using-manipulatives-in-the-classroom/>

“These types of experiences are the best kind for young children because they can utilize their body’s natural need to move.” (The Benefits of Playing with Manipulatives, 2015, pg.2)
<https://blog.ecr4kids.com/2015/09/the-benefits-of-playing-with-manipulatives/>

Quotes from Presentation:

“Manipulatives help students learn by allowing them to move from concrete experiences to abstract reasoning.” (Heddens, 1986, Reisman, 1982; Ross and Kurtz, 1993). (Hand2Mind, 2012, pg. 3)

<https://www.hand2mind.com/resources/benefits-of-manipulatives#:~:text=Manipulatives%20help%20students%20learn%20by,hone%20their%20mathematical%20thinking%20skills>.

“Additional research shows that use of manipulatives over the long term provides more benefits than short-terms use does.” (Sowell, 1989). (Hand2Mind, 2012, pg.4)

<https://www.hand2mind.com/resources/benefits-of-manipulatives#:~:text=The%20use%20of%20manipulatives%20helps%20students%20hone%20their%20mathematical%20thinking%20skills,&text=The%20effective%20use%20of%20manipulatives,deep%20understanding%20of%20mathematical%20concepts>.

“Kinesthetic learners learn best when they process information while being physically active or engaged. These types of learners aren’t necessarily suited for the traditional classroom. They tend to learn best when they are physically active, or through learning activities that involve active participation.” (ThestudyGuru, 2009, pg.1)

<https://www.thestudygurus.com/kinesthetic-study-tips/>

“Students can perform almost any function with a virtual manipulative as they could with a concrete manipulative, such as using tiles to create rectangles and counting them to determine area and perimeter or stacking cubes to determine volume or surface area.” (Intervention in school & clinic, Vol. 45 number 3, pages 186-191, DOI, 10.1177/1053451209349530)

- **Virtual Manipulatives: What they are and how teachers can use them by: Emily Bouck, and Sarah M. Flanagan)**

“There are many benefits of using virtual manipulatives to learn or reinforce learn fraction concepts. These benefits include (a) having a never-ending supply of virtual manipulatives available to students, (b) being able to quickly and easily teach with with more than one model (Part-whole and location on a number line), and © not having to find or construct concrete fraction manipulatives for fractions that are difficult to model.” (Intervention in school & clinic, Vol. 45 number 3, pages 186-191, DOI, 10.1177/1053451209349530)

- **Virtual Manipulatives: What they are and how teachers can use them by: Emily Bouck, and Sarah M. Flanagan)**

“One of the arguments for the use of manipulatives in the classroom is that manipulatives provide an additional channel for conveying information.” Nicole McNeil (2007) (Berkseth & McNeil, The effectiveness of manipulatives in the elementary school classroom, 2013, pg. 4)

<https://digitalcommons.wayne.edu/cgi/viewcontent.cgi?article=1010&context=honorstheses>

“A second argument for manipulatives is that they help students think, reason and solve problems.” (Berkseth & McNeil, The effectiveness of manipulatives in the elementary school classroom, 2013, pg. 4)

<https://digitalcommons.wayne.edu/cgi/viewcontent.cgi?article=1010&context=honorstheses>

One other reason to use manipulatives in the classroom is that they activate real-world knowledge and abstract thinking, reducing the time it takes for children to master skills. (Berkseth & McNeil, The effectiveness of manipulatives in the elementary school classroom, 2013, pg. 5)

<https://digitalcommons.wayne.edu/cgi/viewcontent.cgi?article=1010&context=honorstheses>

However, the research from general education classes using online virtual manipulatives, of which some have included students with disabilities, is positive and suggests that virtual manipulatives are effective in facilitating students’ understanding of mathematical concepts.” (Reimer & Moyer, 2005; Steen, Brooks & Lyon, 2006; Suh & Moyer, 2007; Sug Moyer & Heo, 2005) (Intervention in school & clinic, Vol. 45 number 3, pages 186-191, DOI, 10.1177/1053451209349530)

- **Virtual Manipulatives: What they are and how teachers can use them by: Emily Bouck, and Sarah M. Flanagan)**

“One explanation for this can be attributed to the design of both tools. Concrete manipulatives require teachers to re guide students through the problem solving process once an error occurs, whereas students are provided immediate collective feedback using a virtual program.”

(Campbell University, 2019, Setting guidelines for the use of manipulatives, pg. 1)

<https://guides.lib.campbell.edu/c.php?g=325978&p=2667668>

“Children with down syndrome show higher rates (than typically developing children) of attention problems, and non compliance.” (Feeley & Jones, Strategies to address challenging behavior in young children with down syndrome, 2014, pg.3)

<https://library.down-syndrome.org/en-us/research-practice/12/2/strategies-address-challenging-behaviour-young-down-syndrome/>

“Visual demonstrations, pictures, illustrations can also be successfully used to assist in providing effective instruction in other subject areas of the curriculum. As an educator you can also incorporate tools in teaching phonics, and the development of number concepts. Numicon(c) visually based mathematical materials have been developed with particular reference to the learning strengths and needs of students with down syndrome.

Students with down syndrome generally demonstrate good social skills, which can be constructively utilised to increase learning and teaching opportunities. Tactile demonstrations

and activities also appeal to many students with down syndrome, making it easy for teachers to be able to teach the material. The last thing you want to make sure to do as a teacher is “Structure learning and teaching opportunities to enable the student to engage in tasks with other students, who can maybe act as an appropriate role model and friends.” (National council for special education, 2016, pg. 1)

<https://www.sess.ie/categories/assessed-syndromes/downs-syndrome/tips-learning-and-teaching>

“Assistive technology for down syndrome is a new method that has been developed specifically to help special needs children in the classroom. It includes any type of equipment or materials that will enhance the child’s learning and make the tasks easier to complete, from scissors with a spring to a shortened pencil or enlarged graphics.” (Five ways assistive technology helps students with down syndrome, Editorial Team, 2021, pg. 2)

<https://resilienteducator.com/classroom-resources/five-ways-assistive-technology-helps-those-with-down-syndrome/>

A child with down syndrome automatically has delays in processing information and working to complete tasks.” “When special needs students are in the same classroom as non-disabled peers, it is important to gauge the amount of work they are each able to accomplish in the same amount of time.”

<https://resilienteducator.com/classroom-resources/five-ways-assistive-technology-helps-those-with-down-syndrome/>

A child with down syndrome tends to have shorter stubbier fingers and a lowered thumb making their ability to write more difficult.” “Since some of the wrist bones are not formed, holding regular sized objects and manipulatives may be more difficult for these students.” Five ways assistive technology helps students with down syndrome, Editorial Team, 2021, pg. 3)

<https://resilienteducator.com/classroom-resources/five-ways-assistive-technology-helps-those-with-down-syndrome/>

<https://resilienteducator.com/classroom-resources/five-ways-assistive-technology-helps-those-with-down-syndrome/>

“Assistive technology for down syndrome has also created awareness that children with the condition often have trouble using scissors provided in the classroom. Their hand mobility does not allow the ease of opening and closing the scissors since that motion is difficult.” “The aid provided scissors with springs that are fixed to automatically open once it has been shut. Since the down syndrome children are unable to learn that motion through their own experience, they are able to simulate it through these special scissors.” (Five ways assistive technology helps students with down syndrome, Editorial Team, 2021, pg. 4)

<https://resilienteducator.com/classroom-resources/five-ways-assistive-technology-helps-those-with-down-syndrome/>

”Every child needs these types of opportunities in the classroom, to work with their hands and be able to learn through experience and touching.” (Five ways assistive technology helps students with down syndrome, Editorial Team, 2021, pg. 4)

<https://resilienteducator.com/classroom-resources/five-ways-assistive-technology-helps-those-with-down-syndrome/>

“Assistive technology for this disability offers some creative tactile ideas for allowing special needs children to learn in their school environment.” Example (Forming their letters and numbers in Play-doh or making them in shaving cream on their desk. Children who are just beginning to learn the alphabet can use enlarged letters and glue to trace the letters on the paper. These examples not only are a fun way to learn but also encourages the children to follow the lines while tracing with their pencils.” (Five ways assistive technology helps students with down syndrome, Editorial Team, 2021, pg. 4)

<https://resilienteducator.com/classroom-resources/five-ways-assistive-technology-helps-those-with-down-syndrome/>

“Make math as meaningful as possible in everyday interactions. Even simple tasks like counting items as you add them to the grocery cart and counting and rolling coins make math learning more real to your student.” (Time4Learning, Teaching Math to Students with Down Syndrome, 2017, pg.2)

<https://www.time4learning.com/homeschooling/special-needs/down-syndrome/teaching-math.html>

Process Paper

The process of creating this presentation was informative, interesting and educational. Developing my idea and having it come to life was an important start for me, so I needed to section it into different sub-headings to make it more clearly expressed. Looking at a variety of different articles, websites, and resources was important, because this research helped me to focus on special education, upper elementary, and early childhood.

While I was doing my research I realized that specific teachers' examples of their own experiences would help me. This gave me insight into different materials that I can use in the classroom, and how they can be beneficial for all students. Through my time in the Art of Teaching Program, I encountered various education professionals who helped me tremendously in my studies.

My overall idea was to explore the importance of manipulatives in the classroom. I needed to structure this by looking at different age ranges to be able to prove my point and help my audience understand more clearly. Focusing on different ages was of importance to me as well, because I wanted to know, *How do all ages use manipulatives?* Looking back at my own experience in the classroom, in person and virtually, I wanted to focus on early childhood as well as upper elementary and take special consideration for special education classrooms. While developing my outline, I realized that it would be beneficial for me as an educator to discuss different disabilities and the benefits that they can derive from manipulatives inside the classroom. Throughout this process, I was hoping to learn how to make learning more appealing to all students. I wanted to focus on a variety of students, because I want to be flexible as a teacher, and I want to be able to teach in any grade.

Organizing my information in a clear concise way was important so it was clear to me as well as my audience. I wanted to start on a positive note, so I decided to begin by talking about how many teachers use manipulatives, and the benefits that students gain by having them inside the classroom. Deciding how I wanted to organize the ages of students, I wanted to start first with what I wanted to spend most of my time discussing. I want my audience to be able to understand how important both virtual and concrete manipulatives are to all students. Discussing the use of manipulatives in special education is also important in the beginning of my presentation because of the different factors that children can benefit from with tools. Transitioning from that to upper elementary is what I decided to do next, because it is a change of learning environment and age. Just by discussing this age range for a little bit of time is important because it allows my audience to understand that all students benefit from manipulative use. When I decided to end my presentation with early childhood, it was a decision that demanded serious consideration. While I was making my outline, I realized that I was able to pull from my student teaching at the Early Childhood Center, and it would be a good example of my own personal experience.

There were a few ideas that surprised me while I was doing my research, one of them being the benefits inside and outside of the classroom: thinking about special education, the role of tools in the classroom, and how beneficial it can be for motor skills. Being flexible as a teacher is important because yes, your students are learning material but they are also learning skills that will help them in everyday life. Another factor that seemed to emerge for me while doing the research was the amount of skills that early childhood students gain from having a variety of manipulatives in the classroom. Since they are beginning to explore the world around them in a new environment, the role of manipulatives allows for a smoother transition. While

conducting my research, I also was interested in the importance of technology and virtual manipulatives that help students engage in learning. As a future teacher, you don't want your students to be dependent on technology, because you always want to have a chance to observe their specific thinking process.

One of the major themes that came through for me was the importance of being flexible as a teacher. You need to be able to change things spontaneously in order to make lessons fun and engaging no matter what age group you are working with. I've learned that by being flexible as a teacher, allows your students to see a variety of different ways to learn the same concept that they are being taught. Being flexible also allows you to cater to children who need help, and begin having students learn from one another. One other theme that came up for me was the skills that students learn just by having manipulatives in the class. If you're working with early childhood, upper elementary, or special education, all students are always benefiting from the use of manipulatives when learning different concepts.

Throughout this process I've learned a variety of values and standards for myself and my future students. My main value that I want to bring into the classroom regarding the use of manipulatives is to incorporate them into lessons whenever possible. This is important because students will start to have a positive attitude when it comes to learning, and they will be excited to learn more in depth material. Being able to have tools in my classroom allows me to become more creative as a teacher and have interactive material. I value that my students will be able to have fun but also learn when that time of the day comes. It's important to me that my students have the opportunity to play with the manipulative beforehand, because they will start to learn about how to use them and be able to use them in their own way first. One of my standards inside my classroom will be to treat every tool and student with respect. Setting that ground rule

for my students will allow them to be able to use the manipulatives more while allowing me to have more creative options for lessons. If I can see as a teacher that my students are being respectful to the materials in the classroom, it will allow me to show similar respect and create more interactions when it comes to learning.

As I prepare to begin teaching, I have high hopes that my future experiences will be great ones. I want to remember that it's okay to ask questions if I need help, and I plan to teach that to my students as well. One of the worst things that teachers can do is overwhelm themselves with work, and talking to other teachers will help guide me along the way. I hope that I am able to incorporate everything I want into my classroom, such as visuals like posters and work with manipulatives. Wherever I end up, I aspire to have the opportunity to work with children and have them develop a positive attitude towards learning. I'm still questioning some aspects of my future classroom: *How will I create an environment in which everyone feels comfortable to talk?* or *What will I do in order to cater to my students' needs as learners?*

My overall presentation is how I want my students to become engaged in learning. I want to be able to create interactions between students so they learn who they are surrounded by and what type of classroom environment we will create. I want to take this research that I've done over the course of the year and utilize it into my classroom to benefit my students.

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