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Components Necessary to Create a Flipped Model of Instruction for Accelerating 4th-8th Grade Gifted/Talented Students

Samantha Boyd

COMPONENTS NECESSARY TO CREATE A FLIPPED MODEL OF INSTRUCTION FOR ACCELERATING 4TH-8TH GRADE GIFTED/TALENTED STUDENTS

by

Samantha L. (Waskosky) Boyd

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Facilitator: Patty Born Selly
Content Reviewer: Stacy Waskosky, Scott Sirek & Margaret Thomas
Peer Reviewer: Allie Skjerven-Boyd

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Introduction

Overview

Mathematics is one of the driving forces and most easily identifiable areas that leads staff members and families to recognize a need for acceleration. Almost every teacher has heard a kid in their math class say “But I already learned that!” or “This is too easy.” These phrases are iterated at nearly the same rate as the students who are struggling and might complain by saying “I don’t get it,” “That does not make any sense,” or “This is too hard.” Educators are told that their goal is to focus on getting students to a level of proficiency mandated by state or standardized testing. For the average educator that means focusing on the students who are struggling, students who do not have English as their first language, or students who are right on the border of being proficient or partially meeting expectations based on the previous year’s data (Van der Meulen et al., 2013, p. 289). Many teachers or districts choose to focus on the underperforming students when looking at standardized testing data because their jobs or funding may be tied to that performance ("50 State Comparison: Teacher Tenure - Reasons for Dismissal", 2014).

In my experience, the last people in the classroom that teachers often think about are the gifted mathematicians, for whom math comes easily or who have already mastered grade level content. All educators try to differentiate for their students’ needs, but there is less energy, money, and time put towards differentiating for students who are at the top of the spectrum (Kettler, 2015). Sometimes that differentiation means they become a “helper,” they read, or they just get to do more of the same work. "Where special ed. has a federal mandate—you must meet these students' needs—we don't have that," said Jill Adelson, a research scientist at Duke University's Talent Identification Program and the editor of the journal *Gifted Child Quarterly* (Sparks, 2019).

Teaching in multiple districts and buildings with vastly different teaching philosophies I have encountered methods of math instruction that deviate from the ‘traditional’ model of instruction. The format that has caused me to have some internal struggle and reflection is a model called flipped instruction. Flipped instruction is an approach where students use technology, videos, or online resources to get an introduction or learn content at home or outside of the school day, then return to school to practice and apply the skills with the teacher the following day. The current teaching reality and my past experience in math education has led me to the question: *What components are necessary to create a flipped model of instruction for accelerating 4th-8th grade gifted/talented (GT) students?* I am curious to see whether curriculum can be designed in a manner that is effective and user-friendly for educators to better meet the needs of their students who are gifted or need content acceleration, rather than holding students back so they can keep pace with everyone else because it is easier for the teacher.

Personal History With Mathematics

Being a teacher has always been at the forefront of every goal I set for myself. From an early age, pretending to be the teacher while playing school with my younger siblings, I have had no other career interest to date. I know that my largely positive experience with education and teachers has inspired me to impact students in the same way that teachers played a mentoring role in my life. Growing up, school came very easily to me. I began school a year early at a private Catholic school in the Twin Cities metro suburbs. Reading and mathematics came more easily to me than most anyone else in my classes throughout elementary school.

When I transferred in 3rd grade to a school with a mixed grade and ability classroom structure, I was originally placed in the lowest group with the youngest students. As a very respectful student, I did not say anything about the curriculum being boring or too easy for me until after my parents spoke up at conferences. From then on I was placed in the highest and most accelerated course options for the remainder of that school year. Still, the academic challenge and rigor I needed was not being met, so again I switched schools. I was identified as gifted in 4th grade and placed in a pull-out gifted program for math that was designed to help extend and enrich our math curriculum. This program was one of the highlights of my week, but the rest of my day did not challenge me in the ways that I needed. Even though I was enjoying school, it was always easy for me and so I was always the first to be the “helper” or be given “choice” time.

Finally, in middle and high school there were programs like Accelerated Math, Advanced Placement (AP), and College in the Schools (CIS) courses for me to take that allowed my academic needs to be met. Math was the subject that I enjoyed the most throughout school; it came easily to me and I seemed to instinctively understand where and how to manipulate numbers to solve equations or questions in my head without much effort. Reflecting back on my experience as a student from the perspective of an educator has me thinking about whether schools are adequately meeting the needs of their gifted learners. I think that gifted programming in most districts has come a long way since I was in school as resources and programming for gifted learners are now more prevalent and accessible in districts, but I believe that there is still more that can be done.

Math Instruction in the GATE Program

I teach 6th-8th grade math at a suburban district in the Minnesota Twin Cities metro area as a part of our Gifted and Talented Education Program (GATE.) The current reality of my position involves teaching gifted and talented-identified students who were part of our GATE program during their 4th and 5th grade years. These students are assessed and identified in 3rd grade and are offered, by invitation only, a place in the GATE elementary program that is housed within the Middle School. These students are in the top tier, or highest 3-5%, of our gifted population and begin accelerating their math content through a non-traditional model. My two colleagues instructing our GATE 4th and 5th grade math program assess students at the beginning of their 4th grade year using a standards-based exam or an algebra readiness exam, which is an exam that may qualify them to skip pre-algebra (traditionally a 7th grade course) or algebra (traditionally an 8th grade course). From there, students are placed into one of four math courses: Course 1 (5th grade math), Course 2 (6th grade math), Pre-Algebra, or Algebra. The students then follow an independent study model using an online textbook that includes a couple of example videos per chapter. The students are expected to watch the videos, take notes on their own, select their own practice problems, and then seek out the teacher when they have completed the book practice test. The teacher then gives them the exam, and they either remediate and retake, or they pass and move on to the next chapter. This model of instruction is not truly a flipped model of mathematics. The current flipped instructional philosophy states that flipped instruction is defined as a teacher-created video or online lesson where students have the ability to get exposure to the content outside of class time. They then assimilate their knowledge in class through discussions, problem solving, application, or analysis (Brame, 2018).

When students arrive in my classroom as 6th graders, it is the hope that they completed a course the previous year, but many students come in at all different areas of each of the different courses I teach. It is my job as the GATE educator to help students blend back into the traditional structure of our high school that assumes one student should complete one course of math a year. The high school is not currently staffed using Gifted (GT) funds to support students working at their own pace or needing individualized pacing instruction separate from the traditional classroom model. High school math teachers expect incoming 9th grade students to be ready to begin a new math course from day one, seemingly in lock-step with the paced model throughout the school. Each hour of my school day consists of teaching a different level of math including Pre-Calc, Algebra 3, Algebra 2, Algebra, Pre-Algebra, Geometry, and Flex-Hour (for students who do not fit/are self paced). These six courses are taught in five school periods. For students who don't fit into the "correct" hour for the course they need due to electives, this also means that there are multiple levels of math happening in each hour every day. Within one middle school hour I may have students in Algebra, Pre-Algebra, Geometry and Algebra II, many of which are self-paced or at different places in the curriculum pacing. I currently instruct in a more traditional style of teaching. I use a guided note structure in class to help students stay organized in their academic thinking and also put a heavy emphasis on vocabulary and terminology. Cornell notes are structured with a header, essential questions, right column for key ideas and larger left column for notes, definitions and examples. I have structured my classroom instruction to use this method because I have found that many of the gifted students are struggling with organizational or executive functioning skills. I have also found that they haven't ever had the opportunity to learn and practice good study habits in math because it has always come so naturally and easy for them. When teaching upper-level high school mathematics courses, I have the opportunity to see these students struggle for the first time in their mathematics education, where they may not fully understand and they can no longer get to an answer without showing work. Mathematics is a subject that builds upon previous skills and knowledge. Being able to communicate a process, steps or procedures is critical for demonstrating understanding and sharing your thinking process with others. In my experience, gifted students can struggle with communicating how they arrive at an answer, which can make upper-level mathematics more challenging because they are no longer able to quickly solve a problem in their heads when advanced mathematics and multiple steps are required. As with any natural ability, gift, or talent, there are limitations on how far someone can go or what they can achieve with minimal work or effort put in. Within my classroom, I also try to incorporate as many opportunities to include math talks, application-based projects, and openings for students to express their own understanding of skills and demonstrate the diverse talents and gifts they possess. During the last three years, this process has been messy and ever-evolving. I am completing this capstone as part of my journey to better understand the needs and strengths of my students, and how to best help them with acceleration protocols without sacrificing mastery of content and depth of understanding.

Research Question & Rationale

Teaching in a multi-age and multi-level classroom format has made me wonder if there are better methods to help deliver instruction to my gifted students. As a part of the GATE program for the last 3 years, I have had an increasing number of students come to me at the middle school level at their own academic math pacing. When over half the students that walk through the door are at different places within a math course, it can be incredibly challenging to deliver instruction without pulling students back or trying to manage and teach thirty different lessons within a forty-seven minute class period. In a typical middle school class period I could have anywhere from 8-42 students, depending on math ability and how many students qualified each year for GATE. The course for which I see the most pressing need for acceleration to help remedy student pacing is within the pre-algebra curriculum. The content of the pre-algebra curriculum has many repeated themes and topics of our 5th and 6th grade math curriculum. For gifted learners they are often ready to compact or move more quickly through this content than average peers because they are able to more quickly obtain mastery of skills or make connections between math topics, accelerating their learning ahead of the class norm. These students are often also ready for more challenging algebra topics because they have basic math facts mastered and a strong algebraic reasoning and solving processing ability. Therefore my research question is: *What components are necessary to create a flipped model of instruction for accelerating 4th-8th grade GT students?* The purpose of my research is to help fill a void in my own district, as well as others, to help accelerate students through a pre-algebra curriculum, or 7th grade standards, in a manner that does not become cumbersome for the educator but allows students to accelerate through the content at their own pace.

Components of Research

As previously discussed, I have narrowed down a need for a solid acceleration method of instruction for my gifted and talented students. In order to discover instructional strategies and best practices for GT students, I will begin my research by focusing on the current policies and recommended practices for acceleration, the educational, social, and emotional needs of gifted learners, and the best instructional practices for gifted students. As a teacher, I must keep content area standards at the forefront of my focus when determining the material and content that must be covered by each mathematical level, so I am going to investigate how we can best accelerate meeting both the GT students' needs and the district/state requirements. In this project, I will examine research about outline acceleration (for whom, when it is appropriate, and what are the best methods of acceleration), gifted learners (who are they, their needs, the best way to instruct them), and what elements are crucial for a flipped model of instruction.

Definitions

In order to have a clear understanding of and consistent foundation for my research and rationale, it is important that the following terms be defined: acceleration, gifted/talented, and flipped instructional model. These definitions are to clarify and provide a common understanding of what is meant by acceleration, what makes a gifted child, and a basic understanding of flipped instruction models.

Acceleration: Acceleration is an academic intervention that moves students through an educational program at a rate faster or at an age that is younger than typical. It is about creating a better match between the readiness and motivation of a student and the level and pace of instruction (Behrens & Lupkowski-Shoplik, 2019). Academic acceleration can include grade skipping, early entrance to kindergarten or college, moving ahead in just one subject, and other ways of moving a student ahead to more challenging coursework ("Educators", n.d.).

Enrichment Models: There are multiple models of enrichment for gifted and talented students, and many of these models impact all student populations. The first is School Wide Enrichment Model (SEM) focus is to group students based on interest surveys where students can select choices of enrichment cluster groupings to be a part of. Everyone in the school participates in this model, which allows all students to develop their interests, whether or not they are GT (Vahidi, 2015). Another enrichment model for gifted learners is the Autonomous Learner Model. This model of enrichment is for the internally motivated GT students that are willing to take on their own learning and be the driving force of their own learning striving for continuous development of cognitive, emotional, artistic, social or physical domains. Autonomous learners do not seem to have their thirst for learning ever quenched (Betts, Kapushion, & Carey, 2016). A third model of enrichment is Purdue's Secondary Model which includes components like honors classes, Advanced Placement courses, math/science acceleration, career education and vocational programs along with more. This secondary model has 3 stages of focus:

> Stage I focuses on the development of divergent and convergent thinking skills, » Stage II provides development in creative problem solving, and » Stage III allows students to apply research skills in the development of independent study skills (Van Tassel-Baska & Brown, 2009, p. 118)

This is not the fully extensive list of enrichment models for gifted education, and also does not highlight less structured models such as pull out programming or cluster classrooms as options to help meet the needs of gifted learners.

<u>Gifted/Talented:</u> The US Department of Education (1993) defines giftedness as *"Children and youth with outstanding talent who perform or show the potential for performing at remarkably high levels of accomplishment when compared with others of their age, experience, or environment."* Gifted/Talented students are considered those with outstanding abilities, talents or intellect. Students capable of high performance include those with demonstrated achievement or potential ability in one or more of these areas (Gange', 1985): general intellectual, specific academic subjects, creativity, leadership, and visual/performing arts ("Gifted Education", 2019). The Minnesota definition of giftedness is *"Gifted and talented children and youth are those students with outstanding abilities identified at preschool, elementary, and secondary levels. These students are capable of high performance when compared to others of similar age,* *experience, and environment, and represent the diverse populations of our communities. These are students whose potential requires differentiated and challenging educational programs and/or services beyond those provided in the general school program. Students capable of high performance include those with demonstrated achievement or potential ability in any one or more of the following areas: general intellectual, specific academic subjects, creativity, leadership, and visual and performing arts (MN Department of Education, 2005)."* This definition was adopted from the National Association of Gifted Children, NAGC. Each state can adopt and adapt wording on how they define giftedness, usually from the recommendations from the NAGC.

Flipped Classroom Model: Flipped classroom is a pedagogical approach where direct instruction moves from group learning space into an individual learning space, thus resulting in an educator guiding students as they apply concepts and engage creatively in the subject matter (Flipped Learning Network, 2014). Truly flipped classroom instruction has the classroom teacher creating the flipped instructional videos and resources ("What Why and how to Implement a Flipped Classroom Model" n.d.).

Benefactors of Research

Many people may benefit from my research and this project. First and foremost will be me. As an educator, I find myself wanting to push for more depth of knowledge in math content and for enrichment models instead of acceleration. Using a flipped model of instruction would allow the basic content information learning portion for GT students to be done at home, which would free up daily class time for application based projects, real world understandings and developing depth in student understanding while they have the support and mentorship of a teacher present, instead of expecting that to happen at home. From my own experience I know that with a depth of understanding students will more likely be able to continue using their mathematics skills beyond my classroom. However, I continue to receive resistance from families and other staff members who feel that acceleration via a course skipping structure is the better model. Families and some staff in my district have this mentality that “keeping up with the Jones’ ” is not good enough, they must be ahead, better or faster than everyone else. The perception is that the level of your child’s math acceleration is in direct relation with your parenting status, wealth or education level ( ). So no family wants to be “average” or middle of the pack. I feel that both acceleration and pushing for more depth using an enrichment model can at times be time-consuming and overwhelming for teachers because both require different kinds of preparation. I have not had much experience with acceleration or possess background knowledge on the benefits of acceleration, other than kids taking a test at one seemingly arbitrary point in time to determine if they should skip ahead a level of math or from one data point on a standardized test. Therefore, I am looking forward to seeing how acceleration can happen in a more effective manner, with fidelity to the content itself as well. It will help me broaden my view of mathematics instruction and understanding of the gifted learning population, as well as to help me make better-informed decisions as a gifted teacher regarding the best educational plan and path for each student who comes into my classroom.

The second group that my research will benefit is the school district and our GATE program. Our current model for 4th and 5th grade operates as a flipped model of instruction using only the example videos from our online textbook. This model of flipped instruction does not hold fidelity to the true flipped model of instruction. True flipped instructional models require the teacher to specifically develop and create their own instructional videos that are targeted to meet their student population and demographics. These videos and instructional flipped materials would change year to year to meet the students' needs. This leaves us, as GATE teachers, realizing that there are academic holes in their understanding as they progress in mathematics courses because they are working at their own pace. I am hoping that our program and our students can benefit from an acceleration model that will not compromise their level of understanding and proficiency as they progress ahead of their peers.

Not only will our GATE program benefit by utilizing alternative teaching methods to meet the needs of our students, but my colleagues in the building will benefit as well. Sharing my research and findings may help the other disciplines enhance their curricular components to better meet the needs of gifted learners beyond providing a harder book in English to read, or more papers or reports to write in science, and so forth. I also hope, anticipate, expect, etc. that this research will help to enlighten staff members who are cluster teachers to more traits and needs of gifted learners as our district has required little to no training around GT learners. In order to make this as efficient and as effective a use of time for my colleagues, I would present this either through a slideshow presentation or video, or as a pamphlet for staff to read through at their leisure.

Finally, the people who will benefit most from my research are the gifted/talented and high-achieving students who are in need of math content acceleration. The goal is that this research will provide a sound background of analysis as to why and when acceleration is the best practice and how it can be implemented effectively into a middle school setting using a flipped instructional model.

Summary of chapter

Within this chapter, I have outlined my experience as a GT student and teacher in the realm of mathematics. I examined the area of current needs within my school and teaching community regarding gifted/talented students and mathematics acceleration.

In the subsequent chapters, I will discuss and define how students are identified as gifted and talented (GT), the qualities of GT students, different areas of giftedness and asynchronous development. After defining the GT learner, I will elaborate on different models of GT programming and the pros and cons of each. Breaking down the pros and cons of each model, I will also explore the concept of multi-age classrooms looking specifically at the social and academic effects for GT students and any drawbacks for educators and students. I will examine the types of acceleration and their effects on GT learners academic and social/emotional wellbeing. Finally, my research will conclude with a definition and analysis of the flipped instructional model and AVID classroom strategies and how they can support and be integrated into an acceleration model for GT learners. I have developed a mathematics curriculum and instructional model that can help meet the needs of content acceleration for GT learners, through a compacting model so that there isn't skipping over content or standards. This research has provided me a framework to develop my flipped curriculum model for GT instruction.

In Chapter Two, I will investigate the research on the what, who, where, and how of acceleration policies and best practices in education. I will discuss the unique needs and challenges of gifted learners. I will also dive deeper into the flipped model of classroom instruction to determine the most critical elements that helped to make this model of instruction a success. While conducting my research, I will provide the positive and negative impacts of acceleration and flipped learning, and look at the pros and cons of acceleration and flipped learning through the lens of the gifted/talented student learner.

CHAPTER TWO

Literature Review

Introduction

The focus of my research is to determine: *What components are necessary to create a flipped model of instruction for accelerating 4th-8th grade gifted (GT) students?* To help determine what is needed to best meet the needs of a gifted student learner and what is necessary to create a flipped model of instruction I began my research by looking into who are gifted learners, what are their strengths and areas of potential weakness, and what is needed to help gifted learners at their academically appropriate levels. Throughout Chapter Two I will show the research I found on who gifted learners are, what is the identification processes for GT students, what are social/emotional learning needs of GT students, what are gifted programming models, what is acceleration, what flipped classroom models look like, what are Cornell notes and what are AVID strategies. By breaking the chapter down to these key components it is my goal to give an overall picture of the gifted student and flipped instructional model to then demonstrate how the two can pair in a complementary manner.

Gifted/Talented Learners

Gifted and/or Talented (GT) has often been defined as a child or person who shows an ability significantly above the norm for their age/developmental level ("State Definitions of Giftedness," 2013, p. 3). Students may be referred to as gifted or gifted/talented depending on how they were assessed and what verbiage a school district chooses to use. States and districts can use their own wordage/definitions and criteria for defining giftedness, and this is true for MN and districts across every state. Many districts stick to the a definition as follows or something very similar to:

> Gifted individuals are those who demonstrate outstanding levels of aptitude (defined as an exceptional ability to reason and learn) or competence (documented performance or achievement in top 10% or rarer) in one or more domains. Domains include any structured area of activity with its own symbol system (e.g., mathematics, music, language) and/or set of sensorimotor skills (e.g., painting, dance, sports). ("What is Giftedness?", 2010, p. 1)

There is no standardized assessment or nationwide criteria for determining if a child should be labeled as GT (Mcbee & Makel 2019). Instead, it is up to each individual state or school district to determine those testing options and qualification levels, this leads to a local norm philosophy. The NAGC does provide a guide to state policies in gifted education. The asynchronous development, where parts/components of a child's brain develop at different rates, such as rapid development of speech above norm and much slower development of gross motor skills. This asynchronous development of a GT student often has implications on development that may affect the physical, emotional, and cognitive abilities of a child. For gifted students, these three areas do not always develop at the same rate, which can lead to physical, emotional, or social needs for these students that surpass their age level peers. The research to follow will help to break down the areas of giftedness, what types of assessments can be done to qualify as GT, and the unique social and emotional learning (SEL) needs of a GT learner.

Areas of giftedness. There are 6 - 7 different forms of giftedness: creativity, general intellect, specific academic, leadership, visual/performing arts, and psychomotor, as determined by the Marland Report of 1972 (US Government Printing Office, 1972). To help illustrate below there is a table showing the areas of giftedness and current and historical figures who show many of the qualifying traits that will be explained further in the subsequent paragraphs.

Area of Giftedness	Famous People
Creativity	Steve Jobs, Henry Ford, Nikola Tesla,
General Intellect	Kim Ung-Yong, Marie Curie, Galileo Galilei
Specific Academic	Albert Einstein, Pythagoras, Sigmund Freud, Hans Christian Anderson, Isaac Newton
Leadership	Martin Luther King Jr, Barack Obama, Benjamin Franklin, Ellen DeGeneres
Visual/Performing Arts	Wolfgang Amadeus Mozart, Stevie Wonder, Georgia O'Keeffe, Pablo Picasso
Psychomotor	Usain Bolt, Michael Phelps, LeBron James, Gabby Douglas

Creatively gifted individuals enjoy tasks where they can create or invent things, similar to Steve Jobs and his creation of the Apple franchise. They may also be able to find multiple solutions to a problem, have a sense of humor, or be very independent thinkers (Davis, 1977). Due to their creative nature, they may be well-versed in exhibiting their thinking in oral and written expression to communicate with others, and often will not mind that they stand out from the crowd (VanTassel-Baska, 2004).

Gifted in general intellectual ability often presents as a very inquisitive learner, someone who learns quickly and gets excited over new information or ideas (Manning, 2006). They may begin to formulate and process information in complex ways, making connections that are out of the box for the typical person. With their curious nature and rapid information processing, it is common for them to have a large vocabulary that spans many interest areas (Clark, 2008).

In contrast, a gifted learner with a specific academic ability may be very good at memorizing, have advanced understanding and comprehension in a subject and high academic success in their given interest area(s) (Manning, 2006). Similar to a GT in general intellect, they are also widely read and eager to pursue knowledge of their subject with the same vigor and high levels of curiosity.

Gifted leaders come across as well-organized, confident, well-liked by peers (Foster, 1981), and often set high expectations for themselves (Clark, 2008). These students may be some of the most well-rounded developmentally because they are fluent and articulate in conversations, assume responsibility, and can foreshadow consequences and the implications of their decisions. They tend to like a more consistent structure and routine, and pride themselves on making good decisions (Clark, 2008).

Gifted visual and performing artists have great spatial reasoning skills, an unusual ability to express themselves emotionally through movement, art, drama, and a strong desire to create their own "product," rather than just copying or replicating others. They may be a more reserved, observant learner with above average motor coordination in order to dance, create, or perform.

Finally, the gifted psychomotor students excel above all others in motor skills and coordination. They have precision in their actions and movements, and enjoy the challenge of difficult and varied athletic activities. Students only need to qualify, meet the criteria for being identified, in one area to be gifted, and it is possible to be gifted in two areas but no child is gifted in all 6 areas ("What is Giftedness," 2010, p. 1). The criteria for being identified as gifted can fluctuate from one district to another, as each district is allowed to set their own qualification criteria.

Gifted identification methods. There are numerous types of assessments that districts can give to their students ("Standard 2: Assessment", n.d.). In many metropolitan and suburban areas in Minnesota, it is very common for districts to use a non-verbal exam to test for giftedness. Nearly every district in the Twin Cities area uses the CogAT test. This is just one example of a non-verbal exam to help assess a student's problem-solving and spatial visual thinking. The CogAT test assesses a child's learned reasoning abilities through picture and pattern-based questions ("Cognitive Abilities Test™ Form 7 (CogAT 7)," 2019). While most districts have only one assessment that is non-verbal to help identify students from minority groups or lower socioeconomic statuses, many districts qualify students through multiple criteria opportunities. The goal of the CogAT test is to be as unbiased as possible for all language learners and level the playing field for students who may not have had access to early childhood education opportunities. This helps to identify a broader range of ethnic and socio-economic diversity in the gifted identification process. Many districts will use standardized tests to help identify students for giftedness, often looking at the students in the top 10% of their grade level or looking at students scoring in the 95th percentile and above according to the National Association for Gifted Children (NAGC). They also may use a model that includes completing an intelligence test or an IQ exam. Renzulli (1978) stated that "Giftedness is more than high performance on a standardized intelligence test" (Fonseca, 2016, p. 3).

Understanding that there is more to qualifying as GT than just by scoring high on an IQ test or standardized tests, many districts may have multiple qualification criteria for students to meet. Looking at a number of Midwestern districts' qualifications, students may not have to meet all criteria but often 2 out of 3, have a teacher recommendation, or go through a referral process (NAGC, 2019). These determinations are often made at the administration level within a district, usually consulting the head of gifted services programming within the district (Peters, Rambo-Hernandez, Makel, Matthews, & Plucker 2019). This determination by district or state level leads to gifted identification by use of local norms. Local norms can help to improve equity in identification methods, because you are comparing students of similar backgrounds and experiences instead of the national average or measure. This does mean that the "qualifying" scores by district/state can look different and what qualifies a student in one location, may not qualify them for gifted services elsewhere in the country. The referral process or teacher recommendation would either begin with a staff member or be parent initiated. There would be a form or questionnaire developed by the district to complete, often asking for examples of many examples of the traits of giftedness as described above. This questionnaire could also take place as an interview with the head of gifted services or at an administration level within the district.

Social/emotional/executive functioning skills of GT learners. Gifted/Talented students often have social, emotional, and executive functioning needs that surpass the traditional student because of the asynchronous development of their brain. Asynchronous development is defined as certain areas of the brain developing at different rates. A gifted student may develop their problem-solving skills at a faster rate and with more ease than their emotional and social skills, while their social skills or verbal language may take longer than the typical child to develop (Cash & Heacox, 2014, pp. 36-39). For GT students this can lead to struggles and frustrations as they are often more self-aware of their deficit areas than most children. Gallagher (2013) was one of the first to conduct research on gifted students' self-concept and friendship issues. He was not only concerned about their potential but also their emotional and social well-being. In his study, he concluded that gifted children often selected other gifted children as friends over the typical peer (as cited in Siegle, 2015). Like other children, GT students tend to form friendships and relationships within a comfortable norm. This like grouping for GT students could be the commonality of intellect, the awkwardness or maturity levels that are attributed to asynchronous (and likely below age-level peers), or that these relationships were intently fostered through GT programming models.

Asynchronous development and GT identification do not mean that a child is incapable or unwilling to assimilate or engage with typical peers. Rather, there may be more opportunities for growth and recognizing differences than between typical peers. Looking at modern TV shows, specifically *Big Bang Theory*, it is easy to identify the character Sheldon Cooper as having a superior intellect to those around him (Lorre & Prady, 2007), likely categorizing him as GT. In my opinion, it is also made abundantly clear in the sitcom that Sheldon Cooper struggles immensely with social cues, missings important moments of humor, hints, or subtleties that his friends give throughout the show (Cash & Heacox, 2014, p. 39). Just like Sheldon needs to have things pointed out and explained to help better understand social expectations, many gifted students can fall into this same area of needing extra support to develop certain critical life skills.

When a student's brain is developing at different rates than their grade level peers, who are developing at the normative level of development, processing and inquiry that is expected of the average child, it requires different instruction and skills to be taught to them (Cash & Heacox, 2014, p. 38). For GT students that develop more quickly intellectually, and have slower-developing social skills, they may need to be expressly taught how to interact with peers. They may not pick up on social cues; they may have a tendency to speak down to their peers; they may prefer interactions with adults due to the topics of conversations being more engaging; or they may act bossy or in charge and struggle when rules/procedures are not as they had expected or hoped (Cash & Heacox, 2014, p. 39). This level of emotional intensity can leave a student feeling very sensitive. Given the intellectual abilities of the GT learner, others may have a misconception that they are easily emotionally hurt because of the pressures they put on themselves or perceive that the world has placed on them (Fonseca, 2015, p. 4). In school, some of the students with an easily-identified asynchronous development may stand out to staff and teachers because their areas of deficit are far more extreme compared to the average peer. They may also end up being labeled as or qualify for special education (special ed) services. These students who are both gifted and special ed can be identified as Twice Exceptional (2E). These students need more direct instruction on specific skills and may require more in-depth explanations of why certain social actions are necessary or appropriate for particular situations and interactions (Cash & Heacox, 2014, pp. 10-13).

The more intelligent that a gifted learner is, the more asynchronous their development has the potential to be (Silverman, 1997). The National Institute of Mental Health and the Montreal Neurological Institute at McGill University (2006) asserted “that children with greater than average intellectual ability demonstrate a particularly plastic cortex” (pp 676-679). This section of the brain allows connections to be formed and facilitates higher-order thinking. This development begins and ends later than the typical child, peaking at roughly 11 or 12 years old as opposed to 7 or 8 (Rivero, 2012). This delayed brain development allows the GT learner to have more time for exploration, creativity, and growth development. With some areas of brain development being delayed, it is often assumed that their maturity level matches that of their intellect level, when in reality the two can be very far apart (Cash & Heacox, 2014, p. 37).

Not only is it important for every student, but students who show giftedness in one or more domains to the unique SEL needs of GT students, it is imperative that these students are taught differently than their typical peers (Cash & Heacox, 2014). They need to be challenged and allowed to explore their gifts and talents in order to develop and hone their skills, all while receiving extra support in their less developed areas so that they can fit in academically and socially with their peers to develop relationships and friendships. Unlike special education students who have a wide variety of abilities and needs like the GT students, GT needs are not mandated by any federal statutes and earmarked for any particular funding, so each district has to find a way to support their learners. This leads to a variety of programming models and situations that will be summarized in the next section.

Understanding what makes a child gifted and what their unique needs are is the foundation upon which I will answer my question, *What components are necessary to create a flipped model of instruction for accelerating 4th-8th grade gifted (GT) students?* Knowing how students can be identified and what areas of gifts they possess can help me to highlight their strengths and combat possible areas of weakness, such as an ability to quickly grasp new concepts and combat the struggles of executive functioning/organizational skills. I apply my understanding of gifted learners' development to the process by developing a curriculum for students to accelerate in mathematics. As part of my curriculum, I will take into account that many GT students may need to learn good study habits as math concepts become more challenging and no longer come as easily to students. I will also address asynchronous development by implementing more direct instruction on vocabulary terms and modeling how to take notes, solve problems, and make connections so abstract mathematics can become more concrete and understandable for younger-age learners.

G/T in Traditional Classroom

Attempts to meet Gifted/Talented students' needs are accomplished through a variety of educational formats. Since there are no national requirements, norms, or expectations, each district can provide services as they see fit for their population (NAGC, 2019). Educational best practices for all students include differentiation, but for GT learners, basic differentiation may not fully meet their academic needs. Using and adapting the Response to Intervention Model (Gorski, 1999), there are three tiers of services that gifted students can receive: classroom differentiation, small group instruction/specialized courses, and individual interventions (Cash & Heacox, 2014, pp. 40-41).

These three models are often referred to as "cluster classrooms" (classroom differentiation), "pull-out programs" (small group/specialized courses), and "specialized schools/programs" (individual interventions). For some schools that means that there are cluster classrooms for gifted students (Cash & Heacox, 2014). A cluster classroom is defined as 3 to 8 students with similar gifts and talents are intentionally placed in the same mixed-ability classroom (Mursky, 2011). A second educational method used to help meet the needs of GT learners are pull-out programs. A pull-out model involves students being removed from their general classroom for small group instruction with their academic-level peers (Cash & Heacox, 2014). This pull-out model can be used for extension and enrichment for GT students, but more often is used for remediation for students who are struggling academically. Finally, the last model used to support GT learners is developing an isolated program or school for GT learners. This involves GT students leaving their general peers to attend a school or isolated classroom with only GT-identified students for their core academic subjects. They may see their general peers at lunch or recess if the two programs share a common campus or space; otherwise, these students do not interact at school with non-GT learners. By looking into these 3 models of instructional practice compared to a general classroom setting, I will determine what the impacts are on GT learners, how these practices look in a school/district setting, and which model best meets the needs of GT learners.

Cluster classrooms. A cluster classroom is a setting where teachers have a higher concentration of gifted students in their rooms (Steenbergen-Hu, Makel, & Olszewski-Kubilius 2016). This allows for the teacher to have more training and time to provide differentiated or tiered assignments for gifted learners in the class, or allows for some compacting of curriculum. By clustering a number of gifted students in the same room, it allows them to engage with their intellectual peers during academic discussions and work time. Providing cluster classrooms helps to narrow the ability range within each classroom, allows high-achieving students to emerge and be noticed, and allows for efficient use of funding to provide full-time services for gifted students (Cash & Heacox, 2014, p. 59)

Pull-out programs. Pull-out programs are structured to remove a gifted child from the traditional classroom to get instruction or extension in a specific subject area or for enrichment from their classroom. The current educational systems are often focused on the average or below-average learner, which bypasses the gifted population of students through the use of national strategies like No Child Left Behind (NCLB) ("The Elementary and Secondary Education Act (The No Child Left Behind Act of 2001)", 2010). The pull-out program model is in place to help better meet their needs (Van derr Meulen et al., 2013, p. 289). Vaughn et al. (1991) found that there were small to medium effects on academic achievement of pull-out programs for gifted children (cited from Van derr Meulen et al., 2013, p. 294).

Isolated programs or specialized schools. There are schools and programs within districts that offer a specialized program model for gifted students. These gifted schools or school-within-a-school structures allow gifted students to be placed with their intellectual peers all day instead of with the traditional classroom of students. Vaughn et al. (1991) found that students who were pulled out of traditional programming and enrolled full-time in a separate class program showed substantial increases academically compared to peers not in a specialized program (cited from Van der Meulen et al., 2013, p. 294).

One of the benefits of an isolated program is that teachers do not have to compromise the pace of learning for the whole class, as GT students learn at a more rapid pace and are not held back by lower-ability students. In being a part of a GT isolated programming model, students may not feel as socially or emotionally different within the classroom because they are among their intellectual peers, who may share some of the same asynchronous development traits. In these isolated programs educators have more opportunities to provide individualized learning plans (Cash & Heacox, 2014, p. 41). Parents and students may also feel a decrease in stress, behavior problems, and a stronger sense of belonging within a specialized program (Van derr Meulen et al., 2013). Parents may feel like their child's needs are finally being met and that their son or daughter is being challenged at school. This can lead to a decrease in any disruptive behaviors during the school day as the student becomes intellectually engaged in school and may have developed a stronger sense of self, acceptance, and confidence by being placed with other gifted students (Van derr Meulen et al., 2013, p. 297). Finally, gifted students placed in classes with other gifted students are more likely to feel a sense of belonging because they share some of the same complexities and sophistications that their typical age-level peers may not have developed yet (Cash & Heacox, 2014).

One drawback to this programming model is that these programs may be housed in a location that does not have any non-grade-level gifted peers, which could potentially slow the social development and acclimation to age-level peers when their specialized program merges back with their typical peers at milestones, such as upon entering middle school or high school. One example is a twin cities suburban district that houses their GATE (Gifted and Talented Education) program for 4th and 5th graders, within one of the district's middle school buildings. There is no playground or other age level peers for these students to interact with during peak social time such as specialist, lunch or recess. At these critical milestone changes, it becomes even more crucial that gifted students work on strategies of self-regulation, managing class loads, and navigating a larger network of peers (Cash & Heacox, 2014, p. 38).

Gifted students' needs can be met in a variety of formats, but for mathematics, it is best to allow students to be in a pull-out or specialized programming model (Renzulli, 1987). For the curriculum I plan to design, it would allow any classroom teacher to provide instruction for gifted learners without sacrificing the time or attention needed for planning for any other learners within the class. The goal of my flipped curriculum for the acceleration of a GT learner is that any teacher can provide the needed differentiation for gifted learners. This applies specifically to schools that do not have the resources or funding to provide a teacher to instruct at a pre-algebra level within an elementary or middle school building due to scheduling or cost restraints.

Multi-Age/Ability Classrooms

The United States and Minnesota currently use a model for education that places students in a grade level or academic level based on their chronological age and birthdate, such as beginning kindergarten after a child turns five years old, which is demonstrated by the Minnesota state statute 120A.24. Multi-age classrooms are defined as any class comprising more than one age or grade level (Leier, 2006). These multi-age classrooms can have students up to three years apart in age and even more disparity in terms of student abilities (Pardini, n.d.). From the original one-room school house model, which was multi-age and ability classrooms, the pendulum of society has swung in the opposite direction in the past 50 years. Multi-age education has become a less favorable and less common practice because it requires more work for the classroom teacher and states like MN have gone to age and grade level specific standards, which can be challenging to address in multi-age classrooms when there are grade level standardized tests. Multi-age classrooms are also more challenging for today's school structures because of changing teacher licensure requirements, scheduling and staffing models for buildings within the Minnesota School system. This section of the research will focus on where multi-age classrooms often exist, the social and academic benefits of diverse age-level peers, and the drawbacks for both teachers and students are in terms of management, support, and instruction of this model. It is critical to understand how students may be positively or negatively affected by multi-age and ability level classroom structures as it pertains to the success of a student's academic performance and growth.

Social effects. In multi-age/ability classrooms it is common for there to be an age span of approximately three years, which can lead to drastically different levels of social skills and abilities within one classroom. For gifted students, being grouped in multi-age classrooms would allow for students to group with other gifted children of different ages that may share the same play behaviors and high levels of intensity in particular interests. When gifted students are grouped together they are less likely to have social problems when compared to the average-ability child (Siegle, 2015). Multi-age classrooms also allow GT students more opportunities to learn appropriate social and emotional skills and tools. Many elementary schools have a social-emotional learning curriculum to help teach young students how to appropriately interact, manage emotions, and show empathy and compassion for others (Casper, 2017). By grouping students in multi-age classrooms, students will have the opportunity to practice these skills with more than just their grade-level peers (Reinisch, 1996). This will allow for additional transference of skills.

Younger students in multi-age classrooms benefit from having the opportunity to imitate older children's behaviors, and increase their turn-taking and sharing during activities (Reinisch, 1996). The older students benefit from having the opportunity to help younger students and decrease reliance on the teacher in the classroom so they can facilitate more learning opportunities. At Prince of Peace School, teachers observed the positive effects of students having higher levels of self-esteem, increased opportunities for leadership, and increased maturity (Reinisch, 1996). Students in multi-age classrooms have the opportunity to learn from one another and to develop skills that can be more challenging with grade/age-level peers including: leadership, patience, turn-taking, responsibility, compassion, and maturity.

Teaching strategies based on emotional intelligence (Mayer, 2009) and brain-based learning pair very well with the multi-age model because students are constantly allowed to work collaboratively, make appropriate decisions, and take on more responsibility (Leier, 2006). Emotional intelligence is a student's capacity to reason about emotions and emotional information and of emotions to enhance thought (Mayer, 2009, p.1). Higher Emotional intelligence is also a good indicator of a students success. Brain-based learning engages all of a student's senses within the classroom, creates an atmosphere where students can be relaxed and alert, and engages them in cognitively challenging tasks to increase cognitive stimulation ("Bringing brain-based learning, 2017). This can be done through multi-sensory, hands on and social learning experiences, such as application of math skills by building/creating something to demonstrate a concept. The multi-age classroom model allows for a more child-centered focus, as teachers view them as the children they teach instead of a specific grade that they teach (Pardini, n.d.). I have included research into multi-age classrooms because my school district requires multi-age classrooms for our accelerated GT math programming model at the middle school, as it is the only format that allows students in course alike content to be grouped together for instruction.

Academic effects. In a traditional classroom, teachers must instruct to meet the predetermined grade-level standards for their district or state, in comparison with a multi-age classroom which already has multiple grades and sets of standards being addressed. Teachers in a multi-age classroom must be aware of standards before and after the median age of their class, which allows them to have a longer-range perspective of where and why particular standards are so crucial at each grade level. Due to the vast amounts of standards already being addressed, multi-age classrooms allow for more cooperative and flexible learning where students can move through a curriculum at their own pace (Pardini, n.d). Multi-age classrooms group students by ability and readiness instead of by age level. If a multi-age classroom is grouping solely based on age groups, they are not fully implementing the true concept of the multi-age model (Leier, 2006). Students in multi-age classrooms are often expected or encouraged to be independent, make their own academic choices, or share what they know with their peers/the class (Pardini, n.d.).

Even though multi-age classrooms have been found to meet the needs of students progressing through curriculum at their own pace, there has been little consistent data to support whether multi-age classrooms, in fact, are better at helping students perform on standardized tests. Research from the 1980s and 1990s showed that more than half of the studies showed no significant difference between the multi-age or single grade approaches (Pardini, n.d.)

Drawbacks for students and educators. Daeschner (1993), Superintendent of Jefferson County, KY, said "If you are trained appropriately for a multi-age classroom, there is an advantage for kids. If not, they're better off in regular classrooms" (p. 1). Teachers in a multi-age classroom model need extra training in order to be fully prepared to teach multiple levels of instruction and standards at once (Pardini, n.d.). The hardest part of being a multi-age educator is designing a curriculum that aligns with the Department of Education (Leier, 2006). With standards that must be taught to a specific grade level/age level each year, it means that teachers must integrate topics in order to cover all the requirements of multiple grade levels (Leier, 2006). One strategy teachers can use is to apply overarching themes such as friendly numbers (Weisstein) to a multi-age math class, where some students learn to multiply basic numbers and others are learning about the concept of area and grounding them in everyday applications. Planning for these types of lessons takes more time and a deeper understanding of how standards and skills vertically align amongst grades (Coffmann, 2007).

One drawback for a student's academic performance is if they are transferring in or out of a multi-age program before completion of the program model. Some multi-age classrooms complete curriculum cycles or standards on a two or three-year rotation. This could mean that students miss or repeat standards because of the dates of their enrollment.

Multi-age classroom structures have many positive attributes that should be incorporated into creating a flipped curriculum model for GT learners. As a part of the flipped instructional model, incorporating components where students can collaborate and work in multi-age groups will be critical to support leadership, collaboration, and communication skills among students. There is also an increased level of maturity and responsibility that will continue to be developed through multi-age peer interactions and the independence of flipped instruction. Through this research, it appears that multi-age classrooms will help students work at their own pace to best meet their instructional-level needs and also make sure that students are not skipping and missing standards along the way. It is important to keep in mind that with multi-age classrooms, there is longevity and an extended relationship between teacher and students as they have multiple years together, along with allowing for mentorship and leadership from older peers so younger students can be successful in a more rigorous academic setting. These elements are important to my research as it helps to focus on developing good learning habits for students of all ages with a note structure where older students would be able to guide and demonstrate or mentor younger students entering the program year after year. Through the use of student mentorship significantly less time will be spent building classroom routines, culture and rituals and instead students will take ownership to help guide new or younger students through the expectations and routines of the classroom. This will allow my gifted students to focus their attention on learning content and working towards higher level processing skills of application and creation using new mathematical skills. Multi-age classrooms often exist to provide students with the opportunities they need to better suit their academic needs by providing them with an opportunity for acceleration in the classroom. The next section will focus on defining acceleration and explaining different models and structures of acceleration to meet the needs of the students in the classroom.

Acceleration

Acceleration is defined as progress through an educational program at rates faster or ages younger than conventional (Southern, Jones & Stanley, 2015). Acceleration can be used to help better meet the needs of all learners if they are ready for school earlier than age-level peers and for students who are in need of specific content area acceleration. Acceleration has historically been one method to help meet students' academic needs. Acceleration can have long-term lasting effects on a student's academic, social, and emotional well-being. This research will go through the different types of acceleration, the effects on GT students' social/emotional/academic well being, and methods by which families and students can access acceleration services and what is legally required of school districts.

Types of acceleration. Acceleration can be done using multiple formats including: compacting, content or subject acceleration, or whole grade acceleration (Proctor, Black, & Feldhusen, 1986).

Compacting of the curriculum can be defined as accelerating through a curriculum by pre-assessing students to see what standards or learning goals have been previously mastered, thus allowing them to be skipped, which results in taking less time to complete a given curriculum (Renzuli, 1977). Compacting curriculum allows a teacher to deliver more specialized instruction to each student by providing extra support or enrichment and application-based learning opportunities (Bailey, 1992, p. 55). There are three phases to curriculum compacting. Phase I focuses on defining goals or outcomes from a unit, which would be learning targets or standards for a unit of study. Phase II consists of identifying students who have already mastered the concepts, which can be done through the use of assessments or pre-assessments before a unit begins. Finally, phase III focuses on providing acceleration and enrichment for students who have already mastered the content (Reis & Renzulli, 1992, pp. 53-55).

Content and subject acceleration are defined as students skipping a grade level in one subject or content area (VanTassel-Baska, 2005). Often subject acceleration happens most frequently in mathematics courses and is most universally accepted for the subject of math over any other academic discipline (Benbow & Stanley, 1996). Students are allowed to accelerate ahead in one content area, which may mean they take that specific subject or course with the grade level above them, but they spend the majority of their day with grade-level peers. This helps to meet students' academic needs and decrease boredom during school while helping to combat the problem of having gifted underachievers (Rimm & Lovance, 1992).

In the United States, focusing on Minnesota specifically, whole grade acceleration can happen at a variety of stages throughout the educational process. There are students who are granted early admission into preschool or kindergarten, and thus are a year ahead of age-level peers; students can also accelerate between or during any grade level (Feldhusen, 1992). Requests for early admission for grade advancement can come at the request of teachers or families, and should meet the following criteria: within 6 months of age or meets specific IQ level, comprehensive academic, and psychological and physical assessments, along with receiving feedback from staff in regards to if the child is ready socially/emotionally (Feldhusen, 1992, pp. 46-47). These accelerations should be done on a trial basis in case whole grade acceleration is not an appropriate placement (Mcclarty, 2015).

Effects on GT social/emotional wellbeing. When accelerating a student ahead an entire grade level, there can often be concerns over the social/emotional wellbeing of the child. If acceleration is done with proper assessments and with proper planning and communication, students can accelerate without having any social/emotional adjustment issues (Proctor, Black, & Feldhusen, 1986). By not accelerating a student when it is academically and socially appropriate, there could be more serious social problems that arise due to frustration or boredom by not having their intellectual needs met (Feldhusen, 1992). Students may have concerns over acceleration because they feel they will be missing out on friendships and relationships with their peers. A study by Southern, Jones and Ficus in 1989 showed that the older the student, the more firm their opinion was on not wanting to accelerate due to a possible loss of friendships. The top concerns and fears around acceleration included: removal of contact from peers and threats to social status, school district offerings and transcript concerns, career/post-secondary guidance needing to be more extensive, and the reward vs. risk factor of the GPA and student workload (Southern & Jones, 1992). To date there are very few studies that show either a definitely positive or negative result regarding the social/emotional well-being of gifted students who are accelerated.

Effects on GT academic well-being. When a student is appropriately assessed and accelerated academically, there is an opportunity for a student's intellectual needs to be met. One characteristic that can develop is the "underachievement syndrome," (Cash, 2017) where they lack a sense of locus of control and tend to be highly competitive. Students that exhibit "underachievement syndrome" can cause behavior problems, refuse to make an effort, or may have a negative attitude about acceleration because for the first time they are experiencing challenges and struggles because they are at the academically appropriate placement (Rimm & Lovance, 1992). Accelerating means they have to work hard, put in more effort, and they still may not be at the top of the class, which in turn is troubling to their perception of self. These students are not recommended for acceleration because it will not benefit them, the teacher, or the other students in an accelerated class (Rimm & Loveance, 1992).

By providing the opportunity for students to accelerate through the math curriculum, students' academic needs are going to be met. This will help the students to accelerate ahead in courses so that they can then be paired with their intellectual and motivated peers, which in turn will help minimize behavior disruptions during class or disengagement in school. By focusing on a combination of compacting curriculum and subject acceleration, students will be assessed, placed, and required to complete only the lessons/skills they have not yet mastered in order to move ahead in courses. This acceleration model will also help GT students who are motivated to work during the summer as well to stay sharp on their skills or allow them to complete a credit-by-assessment exam at the start of a school year for whole subject/level acceleration. My instructional model will focus on compacting the curriculum so students get the foundational knowledge necessary to be proficient in their current and subsequent math course standards. As part of my instructional model, the compacting of curriculum will be met by providing students with a flipped model of instruction so each student can have an individualized compacted model, tailored to their individual learning needs.

Flipped Classroom

A flipped classroom is a teaching method where students receive lecture content delivery at home and use class time for practical application and activities (Arnold-Garza, 2014). Flipped classroom models of instruction are relatively new in the past twenty years and include a variety of formats: podcasts, videos, slides, or narrated presentations. Bergmann and Sams have been given credit for developing this teaching model to better support their students who were missing class time for athletic competitions and needed access to the material and time where they could ask clarifying questions (as cited in Hawks, 2014). This instructional model shifts teacher responsibility for student learning to a more active role for the students themselves. This increased level of responsibility includes reviewing lectures outside of class and coming to class prepared to engage in activities and ready to ask questions and clarify misunderstandings. Through the course of researching this topic, clarity will be provided about what flipped instruction looks like, the student’s roles and expectations, the role of the teacher through flipped instruction, and the positive and negative impacts on the students, as well as the impact on the quality of teacher implementation.

Flipped instructional model. The flipped classroom model employs technology and/or video lessons in order to free class time from lectures or direct instruction, allowing for active learning and teacher mentorship to take place during class time (Roehle, Reddy & Shannon, 2013). With the change from a teacher-centered classroom to a learner-centered model of flipped instruction, more ownership is placed on the students to be actively engaged in the learning process (Arnold-Garza, 2014). As part of being actively engaged in the flipped classroom model, students will have accessed foundational learning before arriving at class so they come prepared to engage in deeper understanding, problem-solving, and skill development while having the support of a teacher-mentor (Roehle, Reddy & Shannon, 2013). "The time gained by removing the lecture portion from class allows for more one-on-one personal engagement between teacher and students" (Roehle, Reddy & Shannon, 2013, p. 47).

Impacts on students. The most drastic change from a traditional classroom to a flipped classroom instructional model is the ownership of learning transferring from the teacher to the student. As students have recorded videos to watch, they are able to go back and replay, pause, and in the moment search for more information as they watch an instructional video (Roehle, Reddy & Shannon, 2013). Teachers must provide clear expectations for motivation and self-directed learning in order for students to fully participate to the extent needed for successful completion of the course (Arnold-Garza, 2014). When students are enrolled in active learning courses, Hake found that students would outperform their traditional course peers by two standard deviations (Hake, 1998). The sometimes "messiness" of this instructional model can also help students learn from their own mistakes and may stop teachers from preventing students from gaining a deeper understanding of a content by rescuing them right away (Carpenter & Pease, 2012, p. 38).

As with any model of instruction, there are limitations and it requires consistent and reliable access to technology. Students who don't have access to computers or technology at home, flipped instruction can be modified to CD or DVD as well for student viewing. In a flipped instructional model, it can be challenging for students to adjust quickly to such a new learning environment and the increased expectations and student responsibility (Arnold-Garza, 2014; Roehl, Reddy & Shannon, 2013). Students may also be hesitant to adopt a flipped model because they prefer to work alone instead of in groups during the classroom portion of the course (Hawks, 2014, p. 267). Not only can the flipped instructional shift be challenging to students, but also to teachers who must adapt their traditional teaching ways to alternative media methods in order to be shared online. The complexity of creating and recreating content can challenge teachers as they must be well-versed in the technology needed to present their content (Roehl, Reddy & Shannon, 2013). Students may struggle to manage pacing themselves with time and the workload of flipped instruction (Ash, 2012) This can be a disadvantage for some learners. Finally, there is an inequity component for students who do not have the same access to technology at home, making it hard to view or complete the necessary lesson components at home (Nielsen, 2012). One resolution to this inequity is a district allowing devices to be checked out with video preloaded, sending home CD or DVD of flipped lessons as possible solutions.

Cornell notes. Cornell notes is a structured style of note taking that involves two columns, keywords/questions and main ideas, and a summary component for the notes ("The Learning Strategies Center, n.d"). Cornell notes include a space at the top to write an essential question, a large column on the right for the notes themselves (main ideas), and a slimmer column on the left for the questions or keywords, and a place for a summary at the end (Merrit, Neitz, Selby, 2018, p. 9). The purpose of Cornell notes is designed to help facilitate the phases of focused note taking process by providing space to take notes, connect and summarize the content learned. Cornell notes are designed to have multiple touch points and revisits and revisions. The first time visiting or using notes should be to complete the act of note taking itself, while on the second visit students should make connections, add overarching questions to their notes in the left column. The third visit should be for students to conduct a summary of their learning. These multiple revisitings of content is to help increase retention and connections made with the content (Merrit, Neitz, Selby, 2018, pp. 6-7).

Quality of teacher implementation. Flipping instruction takes even more deliberate planning as a teacher has to determine which elements and standards must be learned outside of the classroom time. Fink's Taxonomy of Significant Learning shows there are 6 areas that can affect change in a learner, or when learning takes place: foundational learning, application, integration, caring, learning how to learn, and human dimension (Fink, 2013). Using Fink's taxonomy, it is easiest to utilize the flipped learning component to cover the foundational learning of concepts, as this is what all other levels of learning are based on (Banks & Henderson, 2019). When the learning of foundational skills is done outside of the classroom it allows for class time to be freed up to engage in activities, discussions, or application of the skills learned. Flipping instruction is not as simple as it may sound, as educators must be knowledgeable of software and new technologies that can make the process easier to record or share the end results (Fawley, 2014). With a flipped instructional model the control of content and instruction does not solely fall on the teacher; students must take a more active role in their own learning.

Through my research and understanding of key elements of flipped instruction, I have learned many elements that are critical for students to have in order to make an acceleration flipped instructional curriculum successful for GT learners. Designing the videos to be short and concise is crucial for student attention spans when delivering the foundational learning skills. The optimal length is under 15 minutes for instructional purposes, but ideally under 10 minutes is even better from the student perspective and increases the likelihood that students will rewatch an instructional video (Berg, 2013). A long term study from MIT (2014) also found shorter videos to be more engaging and they noticed a decrease in engagement/viewership after the 6 minute mark (Guo, 2014). Following these attention and engagement data results, I will work to keep all instructional videos between two minutes and ten minutes in length, for optimal student engagement. Cornell Note structures will help ensure students are learning how to study and improve retention of content. Flipping the instructional videos myself will allow for a smooth transition from an independent learning model to this flipped instructional model, which will eventually transition these students to a more traditional high school lecture-style classroom.

Conclusion

As specified in chapter two, we have established an understanding of gifted learners, their needs, programming models, acceleration, and flipped instruction. Gifted learners have asynchronous development and need additional support in the areas of social-emotional development and executive functioning skills. They also require acceleration to better meet their academic and social needs, especially in the area of mathematics. Through the use of grade-level or content-specific acceleration, students can be intellectually changed with the rigor and complexity needed by a GT learner. Flipped instruction allows students to work at their own pace and provides opportunity for compacting of curricula, more in-depth collaboration, and active learning which in turn helps meet the social-emotional and intellectual needs of gifted learners.

In Chapter Three, I will describe the methods and strategies I will use to develop a curriculum that will allow teachers to flip pre-algebra instruction to help accelerate GT students in their mathematics learning sequence, with the goal that no teacher will be sacrificing instructional time or content for any student in their class.

CHAPTER THREE

PROJECT DESCRIPTION

Overview

This chapter outlines and describes how I utilized the research from Chapter Two to answer the question, *What components are necessary to create a flipped model of instruction for accelerating gifted (GT) 4-8th grade students in mathematics?* My rationale for selecting this as my project relates back to the current need in my district for our gifted programming. The current need is for a structured manner to help accelerate students from an independently-paced and -taught elementary model in fourth and fifth grade to a more traditional secondary model that is teacher-paced. We have a number of students who transition from 5th grade into our middle school that are currently off-pace from the rest of the students coming into the gifted math acceleration program. This leads to the dilemma of the level of mathematics becoming more challenging than a student can do in a self-taught model with any solid level of accuracy or proficiency, along with the challenge of one middle school teacher trying to instruct more than one level of math/concepts within the short forty-five minute class period.

In order for a middle school teacher to be able to instruct and effectively teach almost 200 students a day, it is imperative that we have an alternative option for students to continue acceleration to catch up to their academic peers. By creating a model for flipped instruction of content for GT students, the teacher can ensure that the content is taught with fidelity and accuracy to avoid any mathematical misconceptions while allowing the instructor to focus on lessons for the majority of the class so that others are not being held back or made to wait.

As previously stated, this model is for gifted and talented 4th-8th grade students who are looking to accelerate ahead mathematically in order to catch up to the instruction of a typically-paced classroom. This model can be used as a replacement for traditional classroom instruction but is intended for students who are self-motivated and want to complete more math than is typically expected of a student each day. The curriculum will focus on compacting for the purpose of content acceleration with scaffolded support to help younger learners stay organized in their thinking, mathematical understanding, and communication of learning.

In the sections to follow, I describe the research supporting the instructional strategies I have chosen for the curriculum model, the participants and setting for this curriculum, and a model that I will use to develop a compacted flipped curriculum.

Curriculum Framework

There are a number of instructional strategies and methods for meeting the needs of gifted learners. After learning more about acceleration models and practices and looking at the benefits of each model, content acceleration, grade-level acceleration, and compacting, I have determined that using a compacting method would be best for our GT learners (Renzuli, 1977). By compacting curriculum for students, we can ensure that there are no missed standards or skills, which can sometimes lead to devastating consequences in advanced courses that count towards high school credit when the foundational skills are missing. This model of curriculum compacting through flipped instruction may be less effective if students have not been previously exposed to a flipped or independent study model of mathematics, or if there are technology access barriers for the students and their families (Wang, 2017).

Flipped learning offers a style of learning for students that capitalizes on our information- and technology-driven society (Arnold-Garza, 2014). In flipped learning, students watch a lesson video at home and take notes, so that the practice and application can happen at school under the teacher's supervision and with their support (Tucker, 2012). Cornell Notes allows students an organized system in which to guide their thinking structure, providing them with opportunities to use their notes as a study tool by revisiting them multiple times to add questions and complete a summary reflection (Merrit, Neitz & Selby, 2018, pp. 6-8). Acceleration is needed to help our gifted students stay engaged and challenged in their academic work, especially in regards to mathematics. Instead of providing grade-level or content acceleration, which allows students to skip over some key algebra foundational skills, compacting allows students to proceed through the curriculum at a more rapid rate (Bailey, 1992, p. 55) while presenting the opportunity to be exposed to, learn, and be assessed on all critical algebra foundational concepts (Reis & Renzulli, 1992, pp. 53-55).

There are many methods of curriculum design and implementation. In mathematics, teachers are often limited by the requirements of the school district when it comes to the published curriculum that has already been purchased for implementation. In my district, we are bound to follow the Holt Math Curriculum series (Mcdougal, 2010) to provide consistency amongst our two middle schools and vertical alignment of accelerated courses with the high school's courses. As math educators, we have not been instructed that we have to use the curriculum, but our learning targets and standards are aligned to the lessons for us to help with communication to families regarding student progress and proficiency. Mathematics staff are welcome to incorporate other resources as they see fit, or design their own resources to use as well, but it is expected that teachers follow the district pacing and sequencing guidelines to ease in-district transfers between the two middle schools.

The ability to have some flexibility in what resources are used allows teachers the latitude to try and best meet the needs of their students. Some teams or teachers use Study Island, an online resource paid for by the district that can help meet standards. Others use IXL ("IXL: Math, Language Arts, Science, Social Studies, and Spanish", n.d.), where parents pay a subscription fee to enroll their students.The remainder of the teachers use the provided textbook or develop their own resources for student use. The rigidity of the sequencing and pacing of the math courses at the middle school level results in students, who are accelerated in 4th/5th grade or come from another public, private, or charter school , with a course alignment issue upon reaching 6th grade. This misalignment means that students are accelerated too far ahead when they are not ready, and often means that students are being held back or asked to wait until their peers catch up. The purpose of the curriculum I have designed will allow these students to continue learning while permitting for transition time and flexibility to get all learners caught up to district pacing, without skipping content or developing holes in their understanding of mathematical concepts. The focus of compacting to allow acceleration is so that students who quickly gain simple computational understanding can quickly move ahead and focus their academic class time on deeper conceptual understanding and application.

The curriculum design in mathematics can often be very repetitive in nature. For a gifted student, they may master and understand the concept with minimal practice (1-4 repetitions) while the typical student may need a minimum of 8-18 repetitions (Helwig, 2017). Gifted students can learn content anywhere from 2 to 18 times as quickly as a typical student. As important as it is to cover and teach concepts to gifted learners at a deep level to expand proficiency and application, the current curriculum textbooks used are very cyclical and students see concepts repeated over 4 years of textbooks. They have opportunities to explore concepts in more depth and to do application projects when they are caught up to the district-paced math programming. This curriculum model is only about compacting and condensing instruction in order to advance students to a typical class pace, where they then have the opportunity to dive into more peer dialogue, discussion, and questioning, which they are unable to do while independently-paced. Utilizing assessments will be crucial in determining what lessons and instructional strategies are the keys to creating a successful flipped math curriculum that increases GT student opportunities and success during a compacted acceleration model.

Participants and Setting

This compacted flipped curriculum is designed for 4th-8th grade students who are part of the educational system in the state of Minnesota. Specifically, this curriculum is intended for future implementation in a large suburban school district at an elementary/middle school level where the student demographics are as follows: 87.6%

White, 1.6% Black, 0.4% American Indian, 1.9% Asian, 2.9% Hispanic, 5.6% other. Within the school population, 10.8% of students qualify for free/reduced lunch, 12.4% of students qualify for special education services, .3% of students are ELL, and 0.5% of the student population is currently considered homeless. It should also be noted that when it comes to staffing within this building, the demographics are as follows: 98.46% are White and 1.54% are Hispanic or Latino. Within this building, there are not set computer labs, but each team of teachers does have access to 2-3 sets of computer carts. Teams consist of 150-200 students and contain 4 core teachers in the disciplines of math, science, language arts, and social studies. This year, the school transitioned to a bring--your-own-laptop policy, where approximately ⅓ of the students in the building bring their own device every day. This includes a student and parental contract, a recommended device (not required, but suggested), and parameters in the student handbook on when/where devices can be used. There are very few students who do not have access to technology readily available at home due to device-sharing with siblings/parents, and all students in the gifted program have access to the internet from their homes. This may not be the case in other districts but is the current reality in the district in which I teach. Our district has also just adopted a FLEX/E-Learning day policy for any potential or future snow or cold days, where technology-based assignments are an expectation for many of the families. Incorporating a flipped learning model into my curriculum means that access to technology is critically important for my participants. Any technology that allows students to listen and view recorded instructional content via the internet is acceptable for use with this curriculum model. Currently, gifted students in

4th and 5th grades are self-taught by accessing online textbooks and a few sample videos linked to the textbook website site. This model does not meet the requirements of a flipped instructional classroom but is currently called flipped by some gifted education teachers in the 4th/5th grade program, due to a lack of better wording when communicating with parents.

Project Description

The curriculum I have developed is structured for 18 school days and has 12 unique lessons, with the addition of two pre-tests and two post-tests. For each student, the curriculum duration varies in length and is dependent on their pre-assessment scores around standards and content proficiency. I will provide all content for two units/chapters with the assumption that some gifted students may not pre-test out of any subtopics or standards. The duration of a typical mathematics class period at the middle school is 45-47 minutes long. The students begin by taking a pre-test at the start of a new unit. This pre-test is then graded by the teacher, noting which standards were missed or scored below a minimum of 85% proficiency. These standards are tied to specific lessons, and students must use that as their guide on which lessons they need to go to for instructional videos, practice, and review.

The format of each lesson is designed with the Understanding by Design framework as a model and will begin one evening at home and continue into the next day's class time. The Understanding by Design curriculum model first considers the desired results (MN state standards), then what evidence is needed to determine if those results were met (common summative assessments- district mandated), and finally the flipped lesson videos and notes students are using each day to reach the desired results of acceleration with proficiency (Wiggins & McTighe, 2005). Students watch the flipped instructional video at home, which provides them with vocabulary terms, foundational understanding, and teacher-guided example problems to follow along and record as a part of their note-taking process. It is expected that a video for one lesson lasts no more than 10 minutes. This is to help with student focus, attention, and to break mathematical concepts up into smaller, more manageable chunks. If one lesson requires a video lasting more than 10 minutes, concepts and standards will be broken up over multiple days to better meet the students' needs and to provide more clarity of understanding through the compacting process.

After viewing the video lesson the previous night, students come to class the next day with a foundational understanding of the concepts. They use their class time to practice the math skills and standards they learned, while having access to a teacher who can clarify, support their learning, and reteach or explain concepts as needed. The practice questions are already preselected for students, keeping standards at the forefront, along with taking into consideration subsequent math course skills that may be beneficial to expose students to now so they are familiar with formatting, language terms, or more advanced math concept introductions. During class time, the teacher assists in answering questions, clarifying understanding, and probing students to explain their thinking and understanding. As part of the Cornell Note process, students are asked to do a reflection or summary component on a subsequent day. This helps with retention of information and allows them the opportunity to connect mathematical concepts and enduring understanding from their learning.

Students end the unit with a standard chapter review and then take a post-test. The format of their post-test aligns with that of the pre-test and may include a variety of question styles including multiple choice, short answer, matching, multi-step problem solving, or word problems. The teacher then uses the post-test results to determine if students have met the content standards at a minimum of 85%+. Students then complete test corrections and remediations for any mistakes regardless of their score or level of proficiency. This helps to solidify understanding and bring to light any mathematical errors or misunderstandings that need to be corrected and addressed to prevent further mistakes in subsequent units or courses. This follows the protocol of our district's math policy, expecting that students score a “B” level of proficiency.

The goal of this curriculum model is that students can accelerate without the teacher having to instruct multiple levels of math in a single 45-minute class period a day. It will also be used as a targeted intervention to meet the needs of gifted learners as they compact the curriculum to accelerate ahead in math.

I have narrowed this curriculum down to Holt Course 3 (Pre-Algebra), Chapter Nine (Data & Statistics) and Chapter Ten (Probability). Aligning to the Minnesota standards, students will demonstrate proficiency by completing and mastering content from Holt Course 3 Curriculum Chapter Nine lessons: 9.3, 9.4, 9.6, 9.7, 9.8, and 9.10. These six lessons cover Chapter Nine and address three of the MN state standards and benchmarks. The standards and benchmarks addressed are written out and included in the table below.

	Standard	Benchmark
7.4.1.1	Use mean, median and range to draw conclusions about data and make predictions.	Design simple experiments and collect data. Determine mean, median and range for quantitative data and from data represented in a display. Use these quantities to draw conclusions about the data, compare different data sets, and make predictions.
7.4.1.2	Use mean, median and range to draw conclusions about data and make predictions.	Describe the impact that inserting or deleting a data point has on the mean and the median of a data set. Know how to create data displays using a spreadsheet to examine this impact.
7.4.2.1	Display and interpret data in a variety of ways, including circle graphs and histograms.	Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.

(Minnesota K-12 Academic Standards Math (2007), 2007)

The unit for Chapter Nine on Data & Statistics takes approximately nine schools, assuming a math block is between 45 and 49 minutes in length. In the table below, you will see a breakdown of the 9-day unit, in-class and out-of-class assignments/expectations, and approximate length of time for completion.

Day	In class	At home	Resources & Materials
1	Pre-test for Chapter 9	No homework	District created pre-test
2	Students receive scores on pre-test and determine which standards/lessons they need to do based on pre-test results. Students develop a unit outline for their studies.	Watch video lesson and take notes on 9.3	Cornell Note Page Video Holt Course 3 Book

3	Practice problem listed from 9.3 notes.	Watch video lesson and take notes on 9.4	Cornell Note Page Video Holt Course 3 Book-Page 473 #6-19
4	Practice problem listed from 9.4 notes.	Watch video lesson and take notes on 9.6	Cornell Note Page Video Holt Course 3 Book-Page 479 #6-16
5	Practice problem listed from 9.6 notes.	Watch video lesson and take notes on 9.7-9.8-9.10	Cornell Note Page Video Holt Course 3 Book-Page 493 #1-9
6	Practice problem listed from 9.7-9.10 notes.	No homework	Cornell Note Page Video Holt Course 3 Book-Page 498 #1-6, 13 Page 502 #5-11 Page 512 #5-12 skip 11
7	In-class application of data displays using data on chicken eggs from school science teachers (or other real world scenario).	Complete data presentations and graphs, prepare presentations for class tomorrow.	Data to be collected yearly, so changes by year.
8	Present data displays on chicken egg data (or other real world scenario) to the class.	Review assignment for the test.	Chapter Review
9	Chapter 9 Summative Test		District Created Tests

In Chapter Ten (Probability), students complete lessons 10.1, 10.2, 10.3 and 10.5 from the Holt Course 3 textbooks. Chapter Ten addresses the following 3 Minnesota Mathematics Standards: 7.4.3.1, 7.4.3.2, 7.4.3.3. These standards and benchmarks can be seen in the table below.

	Standard	Benchmark
7.4.3.1	Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.	Use random numbers generated by a calculator or a spreadsheet or taken from a table to simulate situations involving randomness; make a histogram to display the results, and compare the results to known probabilities.
7.4.3.2	Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.	Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals and fractions.
7.4.3.3	Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.	Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.

Chapter Ten needs approximately nine school days, assuming math class periods are 45 to 49 minutes each. The daily schedule breakdown for in-class activities, at-home requirements, and resources used/needed can be seen in the table below.

Day	In class	At home	Resources & Materials
1	Pre-test for Chapter 10	No homework	District Created Test
2	Students receive scores on pre-test and determine which standards/lessons they need to do based on pre-test results. Students develop a unit outline for their studies.	Watch video lesson and take notes on 10.1	Cornell Note Page Video Holt Course 3 Book
3	Practice problem listed from 10.1 notes.	Watch video lesson and take notes on 10.2	Cornell Note Page Video Holt Course 3 Book-Page 535 #5-12, 15-18
4	Practice problem listed from 10.2 notes.	Watch video lesson and take notes on 10.3	Cornell Note Page Video Holt Course 3 Book-Page 540 #6-20
5	Practice problem listed from	Watch video	Cornell Note Page

	10.3 notes.	lesson and take notes on 10.5	Video Holt Course 3 Book- Page547 #1-23 odds, 25-29
6	Practice problem listed from 10.5 notes.	No homework	Cornell Note Page Video Holt Course 3 Book- Page 560 #6-20
7	In-class application project.	Finish up the project and prepare a presentation for class.	Student designed probability experiments, with goal to create a student probability themed carnival games
8	Present project to the class.	Review for Chapter 10 Summative Test	Chapter Review
9	Chapter 10 Summative Test	No Homework	District Created Tests

Within these two selected chapters of instruction, I will use the Understanding By Design curriculum framework to focus on and develop stage 3: learning experiences and instruction. As stage one and two are already predetermined by our district/math department (identifying desired results and determining assessment evidence), it is critical that I focus on the instructional aspects and develop learning experiences to deepen and enhance the GT student understanding. As part of the instructional component, I will design flipped instructional videos (using Screencastify as a digital recording tool) for students to watch at home before arriving to class for each lesson. These videos will be shared with students through my classroom website where there will be links to the notes and videos from Google Drive. When students come to class, each lesson will be paired with practice exercises and learning experiences where they can apply their mathematical understanding. These learning experiences provide opportunities for students to ask questions, practice mathematical skills, collaborate, use mathematical vocabulary, and apply understanding to real-world contexts where they must construct meaning and engage in conversations with other students.

These instructional elements of flipped videos and in-class collaborative learning experiences help students increase their level of proficiency on the summative post-test, along with providing them transferable mathematics skills they can use in other areas of their lives.

Assessment

In order to look at the effectiveness of the flipped instructional model using Cornell Notes as a supporting study and organizational technique, I will measure the effectiveness of the online videos through a chapter pre-test and the end-of-chapter summative exams. Before students begin a unit, I will proctor a pre-test that aligns to the standards and course benchmarks as outlined by the district. The pre-test will be version A of our district-created tests for each chapter.

At the end of the unit, after students have gone through the video lessons and designated practice assignments, they will be given version B of the district-created chapter tests. Version B aligns each question with the same level of difficulty and benchmark skills from test version A; the only difference is that the numbers or variables have been altered slightly for student demonstration of skills, negating the ability to memorize or learn answers from the pre-test version A. Tests A and B are of the same difficulty level.

In order to evaluate the elements necessary to create a flipped version of instructions for accelerating GT students through a curriculum, I will compare the results of students who do an independent study model using the Holt Curriculum example videos as their direct instruction method. This will allow the gifted and talented teaching staff in my building to compare our current model of instruction for GT students (Holt example videos only) to a true flipped instructional model where the teacher has created lessons that target skills, focus on vocabulary, and model note-taking and study strategies. I will have created those videos and then will have tested with my own students, along with the students who have met the qualifications in the 6th grade class to accelerate ahead from 6th grade math to algebra (skipping the pre-algebra course) for the following year. These students are determined by proficiency scores based on MCA data and on our district-created algebra readiness exam, consisting of multiple choice and free response math questions. Per the district's requirement/cut-off for proficiency at an 83%, the instructional model developed needs to maintain at least a 90%+ proficiency level for students on their first attempt at a test to be deemed as a significantly more successful instructional model.

Summary of the Chapter

In Chapter Three, I have discussed the rationale, participants, model, and format for the curriculum I will develop to answer the research question, *What components are necessary to create a flipped model of instruction for accelerating GT 4th-8th grade* *students in mathematics?* After my research analysis from Chapter Two, I have determined that the curriculum purpose will be a hybrid of flipped instruction, using a Cornell Note-taking strategy, with a focus on having this flipped model center on compacting rather than on whole-subject acceleration, so that students do not end up with holes and gaps in their understanding. This curriculum will include two chapters of content, the Minnesota Academic Standards that align with the unit, and would span approximately 4-8 weeks for a student. The curriculum will be created using the Understanding by Design model. The curriculum design will first consider the desired results (standards), then what evidence will be needed to determine if those results were met (assessments), and finally the flipped lesson videos and notes students would be using each day to reach the desired results of acceleration with proficiency (Wiggins & McTighe, 2005).

The next chapter will discuss the results of my research in the form of a curriculum that I will design for accelerating gifted students in mathematics, specifically a pre-algebra curriculum course. I will address the intended participants, the setting for the curriculum, curriculum design and daily lessons, structures, and videos created for the purpose of this project.

CHAPTER FOUR

CONCLUSION

Introduction

At the beginning of my capstone project experiences, I found myself struggling with how to best meet the needs of my gifted and talented students that were multi-age and grade level and independently paced in the mathematics district sequencing. I selected a project to target how I could more efficiently support these gifted learners and help accelerate their learning experience in order to help students arrive at a unified traditional classroom model pacing schedule. At first this project seemed to be for selfish reasons, because teaching 20+ math lessons in one 45-minute class period was not sustainable for me as a teacher. I found myself feeling stretched too thin, and not really teaching in a way that I thought was best or did justice for every student in my classroom. With that as my initial motivating factor I began researching more about who gifted students are, how they learn and how to accelerate and create flipped instructional models. The research and my conversations with content experts were really eye opening and allowed me time to ponder and wrestle through ideas that did not align with my K-12 educational experience. This process has allowed me to better understand the gifted student population I serve and work with every day and has allowed me to explore alternative methods of instructional styles that may help me modernize and improve my teaching practice for students.

Recap of Literature Review

In order to do this project justice I want to recap some of the important ideas around gifted learners, their educational experience and how schools and teachers can best serve their unique set of needs. Gifted students can be identified using multiple measures, most often through the use of local norms within a state or district. Gifted students learn and need to be instructed differently than the typical student, part due to the asynchronous development and the effects that has on their social-emotional development and because of the high level of cognitive processing and intellect levels, these students need fewer repetitions and delivery of content at a much faster pace. Gifted programming models range from pull out classes, to cluster classrooms to isolated programs and special schools. Each has benefits and negative side effects, a combination of options can best help GT students stay well rounded by having their academic needs and social needs met. There are benefits to multi-age classroom models, and it allows for students to develop leadership skills and classroom structures and routines with ease, but it can be challenging and taxing for teachers in terms of content preparation. Acceleration is often needed for GT students in order to have their academic and intellectual needs to be met. Acceleration can include skipping or compacting, my determination is that compacting is the better method for GT students in middle school so that there are no gaps or holes in content understanding later on. The flipped classroom instructional model requires students to watch their teacher's video lesson at home the day before and then come to class to practice and utilize the skills learned in the video, with the support and mentorship of their teacher present. Finally Cornell Notes is an AVID strategy to help students stay organized in their thinking and understanding, which helps to meet the executive functioning or organizational deficit of many gifted learners.

What I Learned & Reflection

When I think about what I have learned and how I have grown as an educator throughout this process I find myself focusing on three key takeaways: acceleration, gifted student needs, and instructional styles for content delivery. These are the areas that I found most challenging, insightful and affirming during my research process.

While researching acceleration within my state and district, I found myself feeling frustrated that there is currently a biased level of privilege when it comes to acceleration within my district. I found that it is primarily the parent’s responsibility to push or advocate for acceleration for their child. This can include for early entrance into kindergarten, gifted assessments if students move districts after/before the designated all grade level testing window, or for accelerated or honors courses at middle school or high school level. Many of these tests are tied back into the state MCA exams of proficiency. There are many twice exceptional children or gifted children who may not be great test takers or perform well on high stakes tests or exams, especially when they feel there is a time limit, even though these tests are not timed. No student wants to be removed from their class to test elsewhere because they are taking longer than everyone else. I think that my district needs to increase the level of transparency for parents within the district about when and how to go about requesting an acceleration evaluation for the grade level or each academic domain. I also think these resources should be provided in multiple languages and specific processes for parents such as forms and deadlines should be communicated frequently. As a teacher in the gifted program and as part of the math department, I am willing to help facilitate some of these conversations to better help meet the needs of our student population and to help to look for inequities in our evaluation process to see if we are missing any students in our experience.

The second element I found more affirming was the needs of gifted students. I find myself daily telling coworkers that my students learn and need support differently than the general grade level math courses. Researching the needs that arise from asynchronous development was impactful and reminds me of why I need to teach, instruct and support differently than a general teacher within the building. I am not saying that teachers should not or do not differentiate, instead I realize that the differentiation element for me is less about the content but more about the speed and the social emotional needs of my students. Recognizing that the social emotional maturity of my students does not always match their high level of cognitive processing or intellect helps me to bridge conversations with staff members about how to help gifted students use their strengths to support them with areas they are less developed and proficient at. It also makes me think more about how I can support the social emotional needs within my classroom and by flipping the math instruction it allows me to have more time to work individually with students and be more attentive to their needs beyond academics.

Lastly, the third that was most challenging for me was considering and looking into a non-traditional style of instruction. Diving deeper into understanding the logic and rationale for flipped instruction, especially in a math classroom setting allowed me to become more open to the possibility of adjusting my teaching style and philosophy. I also feel that by using and understanding the flipped instructional model more has actual help me feel more comfortable releasing control to my students. This shift has helped move my classroom from being more teacher- centered to a more student centered and driven model. This change will help my students take ownership for their learning and allow me to better meet their needs without being stretched thin or overwhelmed with multiple content levels and courses happening at once within my classroom. Finally, it also affirms my desire to have students be collaborative and communicate during math class, which is more easily attainable when the majority of direct instruction is removed from our time together in the classroom.

Implications and Limitations of Project

Throughout this project I had to keep in mind the implications and limitations of the work I was doing. I quickly realized that working in a very affluent suburban district, my students had access and privileges that inner city students from my past teaching experiences may not have had available. As I developed this curriculum and project, I focused my attention on my specific district and student needs, which would not match the average district demographics for language, privilege or socio-economic status.

The biggest limitation I see to my research is the accessibility to technology and the internet at home. It is a rare commodity to have a student population that has 100% access to computers/laptops/tablets, cell phones and high speed quality internet. I know that with the particular group of student's I have had the past three years, these accessibility issues have been non-existent. This is the first school where I have taught, that every student has access and the financial means to these resources. A limitation about my project that is centered around a level of access to technology and resources, which many students may not have available due to financial or socio-economic status. I understand that this access shows a level of privilege, and it would be interesting to see how this type of model of instruction could be adapted down the road for students with less privilege. Some ways I have already begun to look at include a disk or CD-rom of videos/recordings for students to play, but then again that makes the assumption of some level of technology accessibility. A final limitation that I have realized is that this method is not as conducive for students who are deaf or visually impaired. It would take a considerable amount of adjustments to make sure that there are appropriate and accurate subtitles with mathematical symbols/words used in the correct manner for deaf or hard of hearing students, but without a larger understanding around the learning styles and strategies for blind students, I am unsure of how this model could be adjusted as the focus of the math lessons were so visual- there would need to be a conversion to braille and an adjustment to presentation method to best serve those students.

The implications that I have seen for this project is that it allows for students to continue to be challenged in mathematics, without the hold up or the wait time for a teacher to instruct them on what comes next if they are ahead of the class. For my own students they have thrived on the opportunity to self pace and have worked towards having a more deep understanding when they find a topic challenging, so they slow down and spend more time and they feel confident moving ahead of peers when topics come easy to them. There has not been the frustration of waiting on peers to catch up or the guilty feelings of holding the class up every time they have a question or concern. I think that for my district the implications outweigh the limitations, but that is due to the fact that my students are not currently affected by the limitations. This could change as each year new students join the program, but for the time being this model seems to be supporting gifted learners within my school's program.

Future Research Projects

When looking into potential future research projects I see myself going down two possible paths: looking into gifted performance and longevity of understanding or looking into how flipped instruction and access to their teacher during class time for support on content impacts student performance. Looking into future research projects, I would like to focus on looking into the longevity of students who utilize this program and how their scores and success with this pre-algebra/7th grade math standards impacts their future math courses and success levels. I also would be curious to see if a flipped model of instruction would also work to help some of our most struggling, or academically low mathematics students, to determine if doing flipped instruction at home and using class time to practice and work towards mastery of a skill would increase proficiency levels for these students on standardized tests such as MCA.

Conclusion

It all began with the question "*What components are necessary to create a flipped model of instruction for accelerating 4th-8th grade GT students?*"This question was the driving force for my project to help determine how I can move forward as a gifted teacher in an extremely unique set of circumstances. After extensive research and time to develop a curriculum model of instruction I have worked to answer this question as concisely as possible. The components that are necessary to create a flipped model of instruction for 4th-8th grade GT students include: an understanding and willingness that allow for acceleration, teacher modeling and intentional vocabulary instruction, limited in length and intentionally short/targeted content for videos, flexibility for students to work at a more self paced model, collaboration and communication in class with peers, accessibility and financial means for technology, teacher relationship and understanding of student needs and GT needs, and individual teacher created videos and resources targeted to student audience/population.

As part of my flipped curriculum, I have worked to develop Cornell Notes for instruction to model vocabulary, study skills and note organization to help with acceleration, content mastery, and meet the social-emotional and executive functioning levels of gifted learners. The videos I developed are concise, straightforward and focus on key ideas and skills, to weed through the fluff or extra for students who are working towards acceleration and students who do not need excessive repetitions to gain or master a new skill. Third, the flipped instructional model allows for more in class dialogue and collaboration, differentiation and projects or extensions for depth of understanding. Finally, the assessments are targeted to district and state standards and align with the districts common summative assessment policy for mathematics. I believe that these structures developed will best support the needs of GT learners within my district as they work through their 4th-8th grade math experience.

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