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**Young Adolescent Needs = The Common Core**

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## **Introduction**

It is commonly accepted that one of the most frustrating and difficult stages of life is between the ages of 10 and 15. This period in a young adolescent's life offers many challenges for both parents and teachers, but most importantly for the individuals themselves. Between those years, young adolescents are undergoing more dramatic and rapid changes than they will at any other period of their lives (National Middle School Association, [NMSA], 2010). These changes affect the social, emotional, and intellectual development of young adolescents.

As a teacher candidate learning to provide appropriate learning experiences for my future students, I began to look for information on how to implement math instruction that would meet the needs and changes of young adolescents. Since middle level research supports mathematics classrooms that allow students to engage in relevant learning experiences that enhance collaboration, communication, and critical thinking, (NMSA, 2010), I then wanted to look at the mathematics curriculum adopted by the state to see if there were any correlations between the two. The Common Core Standards for Mathematics and Mathematical Practices were under fire and I was hearing different opinions regarding them. Once I completed more research on the standards and practices, I wanted to hear from current middle-level teachers and students. This paper includes the research I conducted in a middle grades classroom to help determine the types of instruction that middle grades students and their teachers felt were most successful in a mathematics classroom and identified the best teaching strategies and practices for engaging young adolescents that would also meet their developmental needs.

## **Literature Review**

### **Developmental Needs**

We started our research by identifying the different developmental needs of young adolescents. Then we identified suggestions made by educational experts as to what a teacher's role should be in helping students meet their developmental needs, while still ensuring that they were growing intellectually, and preparing to become successful adults. Since the Common Core Standards and Practices for Mathematics were used as a guide to update the current North Carolina Standard Course of Study for Mathematics, we examined the curriculum of Common Core, specifically the Standards for Mathematical Practice, using information from the Common Core State Standards Initiative (2014). We then analyzed how these standards were meeting what literature suggested should be happening at the middle level.

The research addressing developmental needs of young adolescents was vast and emphasized the dramatic changes that were occurring. During physical transformations, some of the changes that both male and female adolescents experience included growth spurts, redistribution of fat, widened hips, bone and muscle growth, changes in skin complexion, hair growth, breast development, changes in tone and pitch of voice, acne development, and the enactment of sweat glands that result in body odor (Powell, 2011a; Strahan, L'Esperance, & Van Hoose, 2009). Socially, young adolescents also have a strong desire to fit in, and the fear of not fitting in causes a great deal of stress on an individual. Because of this, these young adolescents will begin adopting new personalities, interests, and appearances that will provide them acceptance into a group of friends (Powell, 2011a).

Emotionally, in the middle grade years, students begin to worry about nearly everything. They are concerned about their appearance, what their peers' opinion is of them, their reputation, and social

acceptance (Powell, 2011a). Each of these fears adds to the individual's anxieties and can result in a great deal of emotional instability (Strahan, L'Esperance, & Van Hoose; 2009). According to Powell (2001a), all of the physical, social, and emotional changes that young adolescents are experiencing can also impact their mental and intellectual growth. Their short attention spans, need for social interactions, and unpredictable emotions makes teaching young adolescents a challenge. At the middle level, the goal is to help students move from concrete to abstract thinking; however, this is not an easy task. In order to help young adolescents experience intellectual growth, it is important that educators be aware of and sensitive to the changes that these individuals are undergoing, and therefore be intentional in designing a learning environment that would be most appropriate.

## **Responsive Environments**

The many changes that the young adolescent body is experiencing, places a great deal of importance on the value of education at the middle school level. Research suggests that each young adolescent is dependent on abundant and meaningful opportunities that will allow him or her to develop the necessary skills and knowledge for being successful in the world (NMSA, 2010). To guide and support them on their journey to maturation, NMSA (2010) suggests that all adolescents should be provided with an education that is developmentally responsive, challenging, empowering, and equitable.

A school that is developmentally responsive should make all decisions in the school based around the nature of young adolescents (NMSA, 2010). The most important step in this process is to ensure that everyone involved in the education of these young adolescents share one common vision—to create a learning environment in which every student can experience success (NMSA, 2010). This vision should then influence the organization of the school and the design of curriculum, instruction, and assessments within the school (NMSA, 2010).

At the middle school level, the idea of teaming is a common factor that is implemented into most high achieving middle schools (NMSA, 2010). Teaming provides groups of students with a common schedule that they know to follow, and it helps build routines that young adolescents are dependent upon (Johnson & Kottman, 1992; NMSA, 2010). For the team to be most successful, teachers must collaborate across content areas to problem-solve, analyze student data, examine student work and behavior, and share ideas and suggestions for the instructional strategies that would be most appropriate for the particular group of students (NMSA, 2010). In addition to the organization of the school and the classroom, the curriculum being implemented and the instruction should also be developmentally responsive to the students. It is essential that the curriculum be based around the interests of the students, keep them actively engaged, and be relevant to their individual lives (Johnson & Kottman, 1992; NMSA, 2010). The instruction should be carefully planned around the individuals and demonstrate an understanding of the ever-changing youth culture (Johnson & Kottman, 1992). When designing and implementing lessons for the middle grades classroom that align with the curriculum, it is important to keep the students in mind and meet them at their level. Incorporating television shows, movies, song lyrics, and other forms of media that the students can relate to will not only make the curriculum more engaging for the students, but it will also be relevant to their individual lives (Johnson & Kottman, 1992). This will increase their chance of comprehending and retaining the knowledge (Johnson & Kottman, 1992). When considering instruction in the classroom, teachers should plan for short and engaging activities that will keep students active in their learning, allow them to socialize with their peers, and accommodate their short attention spans (Johnson & Kottman, 1992). In addition, providing diverse learning opportunities and implementing multiple instructional strategies, is most beneficial for students at the middle school level (Johnson & Kottman, 1992). In addition, it is essential that every young adolescent be provided with an

educational environment that is challenging, yet achievable (NMSA, 2010; Raphael and Burke, 2012). Each individual should be held to high expectations with the recognition that all students can learn and be successful when provided with the necessary tools and resources to help them do so (NMSA, 2010). Although this is not an easy task, the curriculum should be individualized so that each student is receiving an appropriate challenge for his or her ability level (NMSA, 2010).

An effective middle grades curriculum will address the information that students need to excel in society, while continuing to provide opportunities that appeal to the interests of the students (NMSA, 2010). A study on middle grades reform suggests, "...all middle grades students require unique and targeted instruction" (Raphael & Burke, 2012, p.10). It is important for teachers to recognize that the social and emotional needs of students at the middle grades level impact their instructional needs, thus all students should be provided with effective, high-quality instruction that is specifically tailored to meet the needs of the students (Raphael & Burke, 2012).

When designing curriculum and instruction, it is also important for teachers to pose a deep level of questioning strategies, as well as encourage students to ask relevant questions so they begin thinking at a deeper and more complex level (NMSA, 2010). Young adolescents are very curious individuals, and for them to excel at their full potential, it is necessary for teachers to allow them to be curious learners by encouraging research, investigation, and exploration (Johnson & Kottman, 1992). As these students begin maturing, they are academically ready to begin processing ideas that are more abstract and developing conceptual understandings; however, they must be provided with more intellectual challenges within the classroom in order to do so (Johnston & Kottman, 1992). To create this challenging curriculum, teachers must be comfortable and willing to implement a variety of different types of instruction. Students at the middle grades level should be encouraged to question information they are given, engage in discussions, and participate in debates (Johnson & Kottman, 1992). These methods will help students develop reasoning skills and encourage them to develop their own conclusions (Johnson & Kottman, 1992).

## **21<sup>st</sup> Century Skills**

Young adolescents also need to be provided with an education that will help them develop the skills they need to address and manage life's challenges. Teachers can help students accomplish this by providing them with rigorous tasks and activities in which they are responsible for discovering their own approach or method to solve it (NMSA, 2010). It is important to let students struggle and reach an appropriate level of disequilibrium, so that they can begin developing problem solving skills and invent ways to overcome these challenges, as it is in these moments that an individual truly experiences learning (Christie, 2001). When these challenging tasks are being implemented, it is essential that teachers provide students with the needed scaffolding and encouragement to develop persistence and persevere in solving the problem (Christie, 2001).

Another important role that a middle school teacher must play in a young adolescent's life is providing them with the skills and tools that they need to become an asset to society (NMSA, 2010). By incorporating group work and placing an emphasis on effective and respectful peer collaboration in the classroom, teachers are helping students develop these skills (Raphael & Burke, 2012). Group work and a focus on peer collaboration helps students learn to support their classmates and become intentional listeners (Johnson & Kottman, 1992; S. Powell, 2011b).

Lastly, a middle level education that is most empowering for students must help encourage young adolescents to become creative and inventive thinkers (NMSA, 2010; Powell, 2010). In order to accomplish this, middle school teachers must provide students with opportunities for exploration that

will help them discover their individual interests and talents (Johnson & Kottman, 1992). Students should also be provided with multiple options in completing assignments, as well as given the opportunity to express their knowledge in a creative manner (Johnson & Kottman, 1992). Additionally, school can play a role in encouraging students to become inventive thinkers by creating lessons and instruction that connect multiple disciplines (Christie, 2001). Although this can be challenging for students, it is necessary for them to recognize that various topics and concepts are interconnected within society (NMSA, 2010). This type of instruction will encourage students to become more well-rounded and innovative thinkers (Christie, 2001).

Being aware of the dramatic changes and challenges that young adolescents are experiencing during this vulnerable stage of life is essential when designing instruction and a curriculum that is most appropriate for these individuals. Research suggests multiple strategies and practices that should be in place at the middle school level to ensure that students are provided the learning environment in which they will be most successful. Since the Common Core State Standards were adopted and implemented in many states across the nation, we felt that it would be beneficial for us to closely examine these standards and analyze how these standards aligned with what research suggested should be happening in the middle school classroom. We also felt that this information would provide useful information to future middle level educators.

## **Mathematics Curriculum**

The mission and motives behind the Common Core Standards and Practices for Mathematics are to provide students with the knowledge and skills they need to be successful in a world where colleges and businesses are demanding more than ever before. The goal of implementing these standards is to promote and encourage the development of problem-solving, critical thinking, and analytical skills. The Standards and Practices specifically design a curriculum that places a greater focus on fewer topics, coherence between topics, and rigor (Cobb & Jackson, 2011). The eight practices provide skills that all educators should strive to develop in their students. The primary goal of these practices is for students to be engaged in the use and application of mathematics, rather than simply obtaining mathematical knowledge (Schwols & Dempsey, 2013).

The first standard for practice, “make sense of problems and persevere in solving them” requires students to explain the meaning of a problem and looking for entry points to its solution. The second standard for practice, “reason abstractly and quantitatively,” requires students to make sense of quantities and their relationships in problem situations. The third standard for practice, “construct viable arguments and critique the reasoning of others” requires students to understand and use stated assumptions, definitions, and previously established results in constructing arguments. The fourth standard for practice, “model with mathematics,” requires students to apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. The fifth standard for practice, “use appropriate tools strategically,” requires students to consider the available tools when solving a mathematical problem. The sixth standard for practice, “attend to precision,” requires students to communicate precisely to others and to try to use clear definitions in discussion with others and in their own reasoning. The seventh standard for practice, “look for and make use of structure” requires students to look closely to discern a pattern or structure. The eighth standard for practice, “look for and express regularity in repeated reasoning,” requires students to evaluate continually the reasonableness of their intermediate results (Schwols & Dempsey, 2013).

Since the purpose of this study was to determine the instruction that young adolescents were most successful with in middle level mathematics, and to determine the extent that Common Core was encouraging these types of instruction, we designed this study’s instrument in the form of a

questionnaire. A questionnaire served as an effective way to analyze the opinions and emotions of the sample group. A questionnaire was also relevant in helping to categorize the different preferences highlighted by the subjects of the study. Each participant completed the questionnaire anonymously.

## **Methods**

### **Student Questionnaire**

The responses to the student questionnaire were collected from twenty-three eighth grade students from a public middle school in North Carolina. Through students' cited responses and explanations to the questions, data were gained from the following questions: "If you could describe an engaging mathematics class. What would it look like and what types of instruction do you feel you are successful with in mathematics?" These two questions were developed based on the review of literature that was completed for this study and responses provided an understanding of what young adolescents defined as engaging and successful types of mathematics instruction.

There were sixteen key ideas presented in the responses to the questionnaire about the types of instruction that students believed they were most successful with and were most engaging. The key ideas identified were relevance/make connections, teacher makes learning fun, group work, technology, class discussions, questions, hands-on activities, variety in instruction, appropriate pacing/time, connection across contents, organized notes, projects, independent work, investigation, challenging and teacher led. These key ideas were also identified in the review of literature completed for this study.

### **Teacher Questionnaire**

Five mathematics teachers from a public middle school in North Carolina completed the teacher questionnaire. These teachers taught students at either the sixth, seventh, or eighth grade level, and all taught a mathematics curriculum designed by the Common Core State Standards. These teachers were given the option to complete the questionnaire at a time that was most convenient for them and send to the researcher via email. Through the teachers' responses and explanations to the questions, data were obtained by asking the following questions; "If you could describe an engaging mathematics class, what would it look like. And, what types of instruction do you feel your students are successful with in mathematics?" These questions were developed using the information from the literature obtained for this study.

There were eight key ideas presented in the responses to the questionnaire, which included make learning active, group work, class discussion, variety in instruction, technology, investigations, relevant examples and peer teaching. These key ideas were also identified in the review of literature completed for this study.

## **Analysis**

Responses from the surveys were correlated for commonalities to determine how the students' opinions (See Figure 1) of an engaging classroom and the instruction they were most successful with compared to what research and more specifically, the Common Core Standards for Mathematical Practice suggested as the most appropriate forms of instruction for young adolescents. This same approach was repeated for the responses from the teachers (see Figure 2), and their opinions and suggestions were included in the comparison.

Figure 1

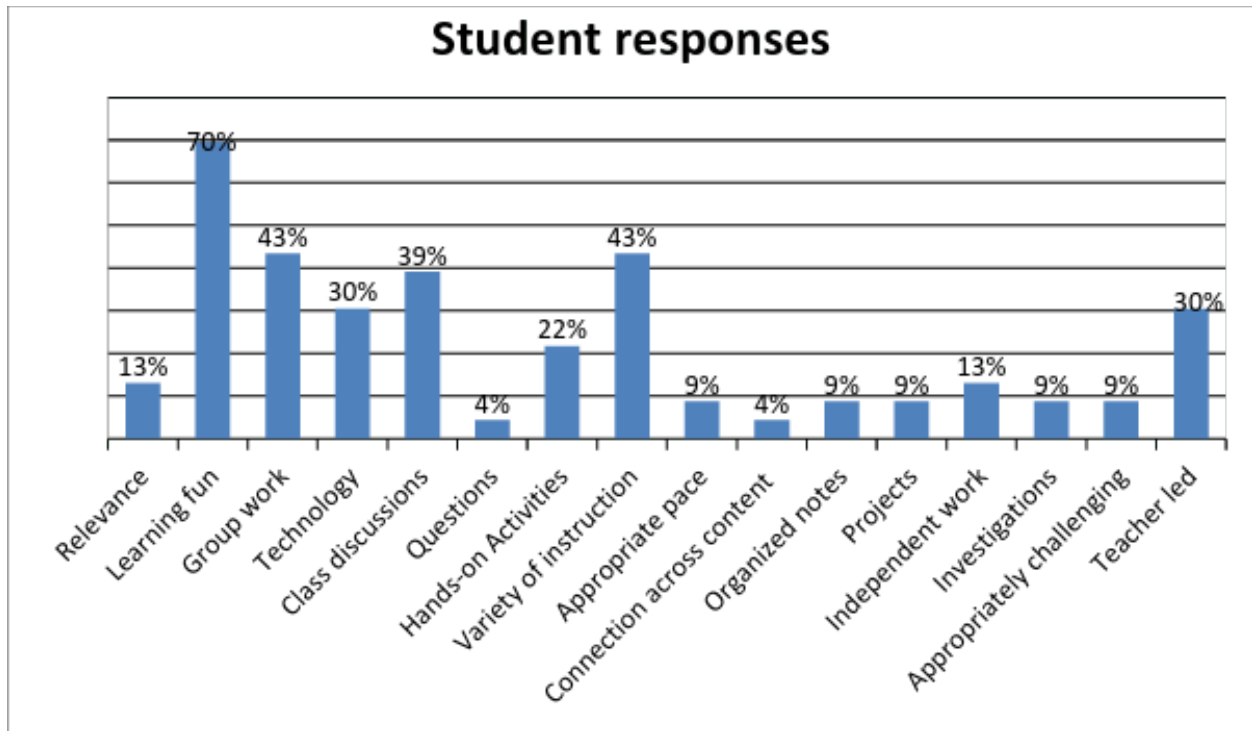
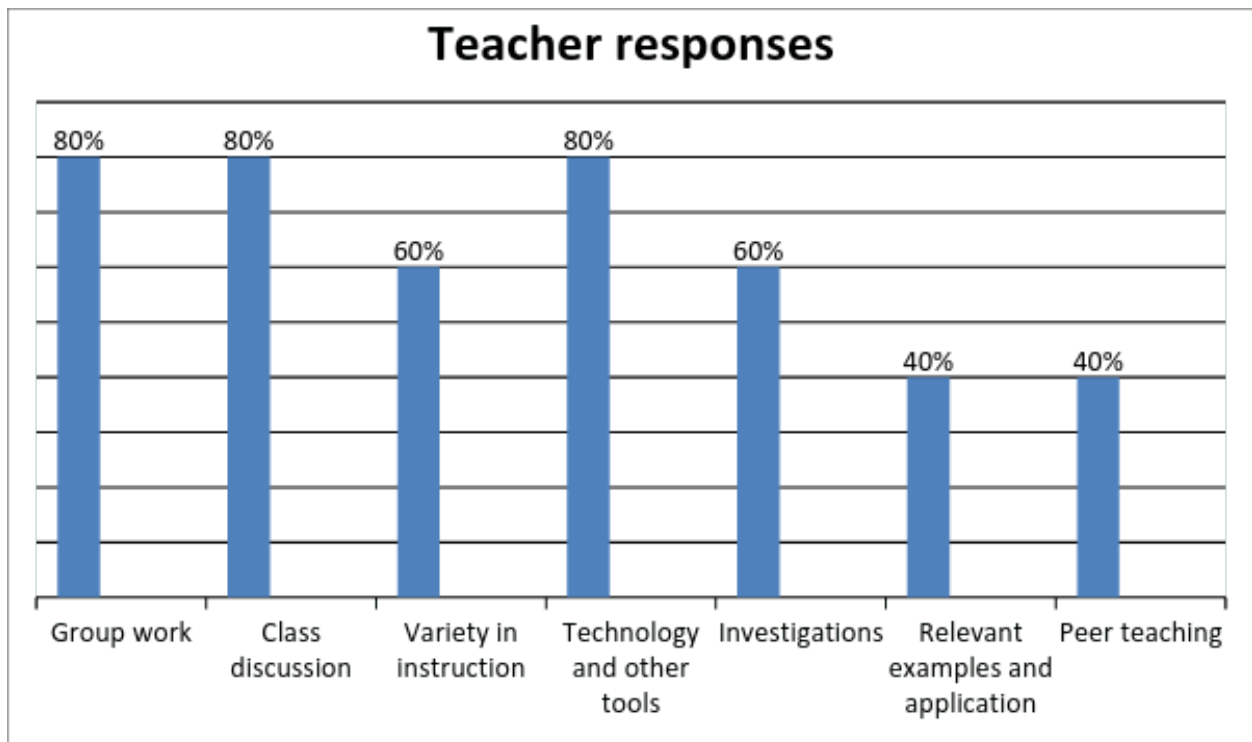


Figure 2



Both sets of participants recognized the importance of students working in groups to discuss mathematics and collaborate with their peers. Forty three percent of students commented that they were more successful when there was an opportunity to work in small numbers. These students also commented that they were more engaged when they were given the opportunity to work in groups first to try to figure out a problem, and then given the opportunity to review with the teacher in the end. Eighty percent of the teachers that participated in this study agreed with the students, that group work was an effective strategy. One teacher stated, "Collaborative groups work the best for students to apply skills they already know and work together to solve problems." In the response to what an engaging mathematics class would look like, another teacher said, "Students were working together in a group to figure out a problem that they aren't exactly sure how to work out. They were talking about math in a meaningful way." Other teachers mentioned the value of incorporating small group activities into their instruction.

Additionally, both sets of participants suggested that class discussions were of great value within the mathematics classroom. Thirty nine percent of students commented that they were most engaged when there were opportunities to participate in class discussions and create an overview of the concepts covered in class. These students also reported that they were successful when the teacher led a class discussion that focused on multiple, relevant examples that as a class the students worked through together. There were also a large number of students who believed the mathematics classroom was best when there was a balance of both class work and group work. Eighty percent of the teachers seemed to agree with the balance in class discussions and small group activities. One teacher suggested that students were most engaged when, "they had to develop their own analysis and then come together to discuss as a whole class." Other teachers commented that when teaching new material, summarizing an activity, or when having a mathematical discourse, class discussions were relevant and necessary.

Thirty percent of the students reported that interaction with technology and more specifically with computers was an important aspect of a successful math experience. Students suggested that using technology was not only more engaging in the mathematics classroom, but that they felt they were more successful when the instruction incorporated technology in some way. From the teacher's responses, it appears that 80% of the teachers also agreed that technology had a place in the mathematics classroom. In one particular response from a teacher, the teacher stated that the most engaging math class that he or she had taught was when students were working with the SMART CPR units to create functions on their graphing calculators.

Additionally, both student and teacher participants emphasized the importance of having a variety of instruction that met different learning needs in their responses. Forty three percent of the students mentioned that they were most engaged when the teacher used multiple instructional strategies including, class discussions, group work, independent work, and projects. They also stated that they were most successful in a mathematics classroom when the instruction was hands-on, had visual representations, and encouraged students to be physically active. One student specifically described an engaging mathematics classroom to have a "mix of different learning styles," where another student described it to be when the teacher "created new ways to learn." Eighty percent of the teacher responses agreed that a variety in instruction promoted a successful math lesson. In one of the teachers' responses to the types of instruction that students were most successful with in mathematics, the teacher replied, "I do not feel that there is one type of instruction from which a majority of the students achieved the most success. Rather, I think that the best type of instruction is one that encompasses all types of instruction seamlessly."



From the responses, it was determined that approximately 70% of the students involved in this study provided answers that suggested that their engagement in a classroom and their interest in a subject were enhanced when they had a teacher that was dedicated to making learning fun. It can also be determined that approximately 80% of the teachers involved in this study suggested that students learn best when they were actively involved in the learning process. When reading the responses of the students, several comments were made such as, “teacher jokes around with us,” “the teacher teaches personally to class,” “teacher who is engaging and fun,” and “active teacher.” From these responses, we concluded that the personality of the teacher and his or her dedication to creating a fun and engaging classroom environment had a great impact on the students’ learning and their interest in the subject area. From the teacher responses, it is clear that teachers of mathematics found value in making learning active. One of the teacher’s responses commented, “When my students had to actually walk, run, stand still, and then describe the function... they loved it!” Another teacher suggested that students were most engaged in math when, “all students are actually talking about and doing math.” Other teachers provided responses such as, “when students are busy actually discussing or uncovering math” and “when they are talking about math in a meaningful way.” After reading the responses to the questionnaires and comparing the comments from the students to the comments from the teachers, we concluded that when teachers were dedicated to creating a learning environment in which students were actively involved in the learning process, then students believed that learning was more fun and were ultimately more engaged.

## **Discussion**

The responses from the student and teacher participants provided evidence that the Common Core Standards for Mathematical Practices aligned with what students and teachers believed were of greatest value in the learning of mathematics.

Many students in their responses discretely addressed the first two mathematical practices. Although these standards were not explicitly stated, multiple students suggested that they were most successful when they were given many examples with which to practice. Multiple students also emphasized their interest and need for visual representatives, and suggested that they were most successful and more engaged in a math classroom when they were provided with visuals. Having these multiple examples and representations of mathematical concepts would also help students to develop the ability to decontextualize and contextualize when given a scenario or problem to solve.

Many of the students commented on their desire to have class discussions and work in small groups with their peers. This suggested that students felt that collaboration with others about mathematics was essential for being successful in a mathematics classroom. One student actually stated that he was most successful in mathematics when he was asked to “prove his knowledge.” Another student said that he or she learned best when, “an in depth conversation about new information that hadn’t been learned before occurred.” Additionally, several students emphasized the importance of being able to ask questions to develop a better understanding of the concepts being taught. One of the teachers also replied that students were more engaged and most successful when they were having mathematical discourse about a topic and struggled together to uncover an answer.

One particular student stated that she felt most successful with the instruction in a mathematics classroom when she “understood the lesson and could see how and why to use it.” Other students suggested that they were more engaged when provided with several real-world examples and the mathematics actually meant something. One of the teachers stated in his response to the questionnaire, “An engaging math class would be students working cooperatively to problem solve. They were able to successfully use the resources given and work together to solve problems that

applied to their daily lives.” In her response to what students were most successful with in a mathematics class, another teacher stated, “Real world concepts that they can relate to make a big difference – not just teaching the numbers but connecting it to something bigger!”

Numerous students suggested that they were most engaged when they had the opportunity to use computer programs and online sources to complete a task. Additionally a student stated that she learned best and was more engaged when there were a lot of electronics involved. One of the teachers suggested in his response that middle level mathematics students still benefited from manipulating materials and other tools when trying to develop conceptual understanding. However, it was also mentioned by one of the teachers, that not only should students be provided with resources, but also they should be able to use successfully the resources they were given to solve problems. After reading these responses, it is clear that much like the Common Core Standards for Mathematical Practices, these 21<sup>st</sup> Century learners and their teachers placed great significance on having a variety of tools and forms of technology implemented into their mathematics classroom.

These last two mathematical practices were apparent in many of the responses to the questionnaire. Several students stated that they learned best when provided with multiple examples to practice and apply the math that they were learning. One specific student actually stated, “I think it works best when the teacher uses a lot of examples to help remember rules.” These student responses and the apparent need for multiple examples to practice with, suggested that students found value in searching for repetition and patterns in their mathematical computations.

## **Conclusion**

To be an effective teacher of young adolescents at the middle level, it is essential to be aware and sensitive to the dramatic physical and emotional changes that these individuals are experiencing. Research suggests that these changes have a very large impact on a student’s educational experience, thus it is of utmost importance that middle level teachers in any content area be aware of the challenges that their students may be facing and intentionally design instruction that is most appropriate for their individual needs.

At the middle level, young adolescents have a need for social interactions and peer acceptance. Because this need can overwhelm the individual and consume most of their thoughts, academics may be of little concern to these students. Rockoff and Lockwood (2010) would argue that middle level is in fact a waste of time because schools place too large a focus on meeting the social and developmental needs and not enough focus on academics. In contrast, research completed by the National Middle School Association (2010) now known as the Association of Middle Level Education (AMLE), suggests that the middle level years are indeed important; however, while students are in need of social interactions, middle schools must support the social needs of students while still ensuring that those students are experiencing academic growth. To achieve this, AMLE now affirms that young adolescents must have an education that has the following essential attributes: developmentally responsive, challenging, empowering, and equitable. In *Wayside Teaching*, Powell (2010) also suggests the need for teachers getting to know their students and building relationships with them. This form of teaching emphasizes the importance of teachers encouraging a culture of compassion and acceptance, infusing humor, revealing their personal self, and creating and maintaining an inviting classroom.

Across the nation, the Common Core Standards are the mathematics curriculum implemented in most classrooms today. Although a seemingly controversial topic, when unpacking the Common Core State Standards for Mathematics and Mathematical Practices, it was clear that the curriculum

was designed specifically to promote and encourage the development of problem-solving, critical thinking, and analytical skills. These focal points for designing mathematics experiences align directly with what middle level research and current middle level students and educators of mathematics suggested that an effective middle level education should look like.

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