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Real World Math:

Views from the Researcher, Teacher and Student

by

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I walked into a fifth grade class after a three week winter recess, and math instruction was about to begin. Multiplying decimals was the topic to be learned today. When going around to help students, the question "Why do I need to know this or anything about math?" was going through some minds and this was the time of day absolutely dreaded by a ten-year-old. As days went on there were some kids that always knew the answers, some that got a right answer once in a while, and some always confused and frustrated. This insight is an example of how the achievement gap can been seen in the classroom and how it can affect future learning expectations.

What is the Achievement Gap?

The achievement gap has narrowed in the past and is currently expanding again. Research is being done throughout the country to find teaching approaches and techniques to provide a meaningful education to students. At a recent Southwestern Educational Development Laboratory (SEDL) sponsored networking forum for mathematics educators, participants offered the following definitions of the achievement gap: "The difference between a child's potential and his or her actual achievement." All students can learn and be successful. Educators must hold the same expectations for every student and be flexible in their instruction to meet each need. Students do not learn the same way for every lesson and teachers need to realize that a child's potential could be capitalized by various learning styles. " A student's learning always needs to be encouraged to grow. Teachers should not accept an average performance if the student is capable of higher achievements.

The "achievement gap" is a matter of race and class. Across the U.S., a gap in

academic achievement persists between minority and disadvantaged students and their white counterparts. This is one of the most pressing education-policy challenges that states currently face. There are several ways to measure the achievement gap. One common method is to compare academic performance among African-American, Hispanic, and white students on standardized assessments. In low-income communities a fourth-grader is already three levels behind their more affluent peers (Closing the Achievement Gap). About 1 in 30 Latinos and 1 in 100 African Americans can comfortably do multi-step problem solving and elementary algebra, compared to about 1 in 10 white students (Closing the Achievement Gap). However, the gap exists in all schools in some way, even those that are attended by the majority race.

Economic classes are also at opposite ends of the spectrum. Students coming from low socioeconomic backgrounds, and often minority backgrounds, seem to be the group affected most by the math achievement gap. Most math classes present the subject as a series of isolated, increasingly complex problems. Students who answer the difficult problems the quickest get rewards from the teacher. The rest develop a sense of failure, and fall into the ranks of the mathematical illiterate. The subject of mathematics is crucial for all students to learn and find meaning because it can be found in myriad aspects of our society. Whether one is at work, buying groceries, or reading a clock to determine time, math can be found by all. Educators must create an atmosphere where this is possible and learn all they can about their students' abilities. Real-world math problems and strategies have proven to be effective in making the subject more meaningful to students. Giving the students material that is relevant to their lives and found in every day scenarios is not only more interesting,

but also more memorable in future years of schooling. This essay will focus on views from the researchers, elementary classroom teachers, and the students of a low socioeconomic school. The achievement gap is prevalent and can be narrowed through the implementation of real-world mathematics into the curriculum. I will follow the viewpoints with a reflection of my own attempt to provide relevant and meaningful instruction to a fifth-grade class.

The View of the Researcher

Today, education leaders recognize that inequities exist in all contexts, and in mathematics education they realize that teaching and learning will improve when equity is given the same attention that is devoted to curriculum, instruction, and assessment. When time is devoted to math instruction and exploration of activities, students are bound to see the relevance to their everyday lives and build a stronger conceptual foundation. Rochelle Gutierrez, author of "Beyond Access and Achievement: Equity Issues for Mathematics Teachers and Leaders" states, most inequities arise in the learning context and reflect deficiencies in the opportunities that a student has to learn in meaningful ways—not a lack of motivation or intellectual capacity (5).

There seems to exist for each individual a link of relations between the world in which mathematics is developed, and the world to which it is applied. It was not until the 1970's that researchers started to realize this fact. Yet a widely held opinion still leads itself to the belief that mathematics can be learned in school, embedded within any particular learning structures, and then lifted out of school to be applied to any situation in the "real world". Jo Boaler, author of "The Role of Contexts in the Mathematics Classroom: do they

make mathematics more real?" says, a number of research projects are now challenging these perceptions with observations that mathematical performance is markedly inconsistent particularly across what may be termed as ‘school’ and everyday situations. It therefore becomes necessary to consider the ways in which students’ goals are structured, and how the environment which guides them contributes toward a development of individual meaning. From this, students will develop an understanding of real world connections (Boaler 5). Students assume significant beliefs about mathematics and they fail to build true comprehension. Instead, they view the teacher as the source of knowledge and attempt to solve tasks by reproducing explicitly taught procedures and interpret problems partly by the identification of superficial cues. The encouragement of inventive strategies and constructive discussion allows students to develop true comprehension and view the teacher as a facilitator. Boaler concludes that if a student’s social and cultural values are encouraged and supported in the mathematics classroom, then their development of learning will have more meaning for them. The classroom becomes a closer representation of their ‘real world’ experience, and ultimately, will be given enhanced mathematical recognition in a social setting (13).

In Lauren Resnick’s article, “Learning In School and Out”, she claims popular wisdom holds that common sense outweighs school learning for getting along in the world—that there exists a practical intelligence, different from school intelligence, that matters more in real life. This supports the theory of constructivism: moving away from standard algorithms and more toward inventive strategies. In school, students are often graded on what they are able to do individually, whereas, outside of school tasks are often shared. The

part of the article I focused on most was symbol manipulation in school versus contextualized reasoning outside of school. In the real world tools are available when needed and are often relied on. Outside school, actions are closely connected with objects and events; people often use these objects and events directly in their reasoning, without necessarily using symbols to represent them (Resnick 14). School learning is mostly symbol-based and the connections to the objects and events are often lost. An example that the article mentioned was buying an ice cream cone for 60 cents and some coins were in hand—a quarter, a dime, and two pennies. The students were asked, 'How much more do you need to buy the cone?' If taken as a real-world problem, the question would probably lead to a search for 'round change'—a quarter or dimes and nickels. In school, it is more often interpreted as an invitation to do pure calculation (Resnick 14). This is a prime example of how school arithmetic and real world use of number knowledge do not always go hand in hand. Because students can fall into the trap of forgetting what their calculation or their reasoning is about, symbolic activities tend to become detached from meaningful context, and as a result the achievement gap will continue to grow. The modification of mathematics curricula to better enable it to promote skills for learning outside school may simultaneously renew its academic value to students.

Teacher preparation programs in math education include research components to the curriculum, using national organization's textbooks of complied case studies that focus on real-world math and its importance in the classroom. According to the National Council of Teachers of Mathematics (NCTM) textbook, Putting Research into Practice in the Elementary Grades: Readings from the Journals of the NCTM, the standard is that

educational experiences in the classroom support equal achievement and future participation in math for all students regardless of their gender, ethnicity and race, or socioeconomic background. Presenting students with problems or ideas that are not meaningful or relevant to them may limit their potential to connect or use informal knowledge (NCTM 295). This lack of connection in turn may discourage a student from attempting a solution or suggesting an approach in group discussion. A student's thought process should be recognized and valued.

Studies concerning factors of class and race equity conducted on the mathematical performance of all students and the performance of certain groups are further examples of the gap. Socioeconomic status (SES) is an important factor in academic achievement. Low income students often do not come from homes with an academic environment, thus, teachers must provide the encouragement and resources for support. We often hear that having a minority background plays a part as well; however I have found this gap in a classroom that is populated by the majority, but still at a disadvantage financially. The NCTM proposes that bringing an out-of-school feeling into the classroom will help with the disconnection found in these groups. Having problems that are in a familiar setting, dilemma driven, goal directed and can be solved by a student's natural language are suggested (NCTM 76). Including these factors into the classroom will give all students a purpose for what they are learning and make math more enjoyable.

The results from research studies have inspired national organizations to start programs and initiatives to end this crisis. Teach For America, Inc. is aimed towards teaching urban and rural low income communities that are often forgotten. The mission is to

build the movement to eliminate educational inequity by enlisting our nation's most promising future leaders in the effort. The values that are held at the core of the program are: sense of possibility, disciplined thought, respect, humility, integrity and relentless pursuit of results. When the students know these are the pillars that their teachers are supporting they will be given hope in a subject that may have always been a source of failure. A math initiative was started in 2004 to focus on the quality and meaningfulness of the math education provided to these students. They have recognized a particularly urgent need for excellent math education in the United States and are specifically working to bring increasing numbers of outstanding math teachers to our country's lowest income communities. Currently, approximately 1,700 corps members are teaching math to more than 200,000 school students. Katie Bowen, Teach For America Math and Science Initiative Head, says "the program is working to differentiate the support that we provide to our teachers in these disciplines to build the pedagogical content knowledge that they will need in order to be successful. We provide training around the most important skills that teachers need and help teachers locate and use the curricular tools that will lead their students to the greatest possible success." Teachers create an equitable learning environment with the resources they have. Teachers set goals that they – and their students – believe are meaningful for the students' futures. In addition, Teach for America, Inc. helps teachers invest their students in these goals by helping to build their confidence, their desire to learn the content, and by connecting their work in class to their future interests.

The Education Trust believes strongly that the achievement gap can be closed while improving students' view on education. The mission statement is to work for the high

academic achievement of all students at all levels, pre-kindergarten through college, and forever closing the achievement gaps that separate low income students and students of color from other youth. Their basic tenet is this — All children will learn at high levels when they are taught to high levels. Staff at The Education Trust travel around the country speaking about the achievement gap and what they believe can change this disparity.

> "When we speak with adults, no matter where we are in the country, they make the same comments. 'They're too poor.' 'Their parents don't care.' 'They come to school without an adequate breakfast.' 'They don't have enough books in the home.' 'Indeed, there aren't enough parents in the home.' Their reasons, in other words, are always about the children and their families. Young people, however, have different answers. They talk about teachers who often do not know the subjects that they are teaching. They talk about counselors who consistently underestimate their potential and place them in lower-level courses. They talk about principals who dismiss their concerns. And they talk about a curriculum and a set of expectations that feel so miserably low-level that they literally bore the students right out the school door" (Haycock).

Kati Haycock, President of The Education Trust, says to increase the achievement levels of low income students, we need to focus on what really matters: high standards, a challenging curriculum, and good teachers. She says that providing students a challenging curriculum that includes real-world content is important; however if the teacher is not confident in the material relevance, then the students will not believe it either. The achievement gap is not based solely on student performance but also teacher performance. The Associate Director

of PK-12 for School and District Assistance, Jennifer Smith, provides teachers with the results from the research and the training necessary to become confident and effective when implementing the new and constructivist math education.

The views are consistent from researchers and organization heads, real-world math plays a crucial role in making math more meaningful to students of low socioeconomic status. Student expectations should be equal to those of more affluent students and should be supported by the educator. The curriculum should not be "watered down" so that students appear to be performing better. Teacher preparation should include proper training with the evidence available to support its relevance.

The View of the Elementary Classroom Teacher

I had the opportunity to anonymously survey thirty classroom teachers, kindergarten through sixth grade, in three southeastern Michigan school districts. Every teacher, identified as lower elementary, upper elementary, or other, is employed by a school that qualifies as low-income by Michigan standards. The results I received were somewhat expectant from reading the research; however still stunning. I asked five questions and will share the results, quoting the more surprising answers.

Question One: What is your view on math education?

Math education is highly recognized as an essential need for all students to be successful. "A solid foundation in math is so important for our students to be successful and have more opportunities later in life." The memorizing of basic facts versus the use of

inventive strategies is a topic that was supported on both sides. First through third grade teachers said that inventive strategies are key to successful learning and a deeper comprehension. The upper elementary teachers stated that memorization of basic facts should also be encouraged at the lower level because using inventive strategies is time consuming, and can cause students to keep falling behind their peers. Teachers at the upper level also agree that learning should be developed conceptually first at the lower grades, and then students would not struggle as much when topics were advanced. "I think the math curriculum has gotten much harder, I've taught 1st and 6th grade. Now I teach 1st graders little songs and movements for things I know they will need to remember later." All teachers surveyed wish they knew math more thoroughly themselves, and valued the use of manipulatives and real-world projects.

Question Two: Is math a favorite subject of yours to teach? Why or why not?

Eighty percent of the teachers said that math was not a favorite of theirs to teach because they didn't feel confident in their own abilities in the subject. Some of them dreaded "math time" just as much as their students did. A lower elementary teacher answered, "I hate math and I always have. When it gets to that time of day to give a math lesson I feel like I do a very inadequate job." An upper elementary teacher answered, "No—my students come to me with such varied levels. I need to differentiate for six different levels—which is near impossible." Overall, I received math is not a favorite subject because the teachers were taught using traditional paper-and-pencil methods and do not understand a lot of the hands-on or modeling teaching strategies. Thus, not feeling like they reach their students. As an

educator myself, I understand that it is difficult to meet all the abilities of today's classrooms; however, it is something that can be achieved.

Question Three: Do you feel the math curriculum provided for you is more traditional or more constructivist?

This question raised some interesting responses, and is a heated issue in one of the districts. "What math curriculum? Our district does not have one and I feel that are students are at a disadvantage because of it." From another teacher in the same district. "I have Grade Level Content Expectations to meet and a textbook, but no curriculum." The overall feeling of the textbook that was provided to that district was more traditional in nature with a few constructivist lesson ideas.

In another district the curriculum provided was more constructivist and laid out like a script for the teachers. "I like the series that our district uses because it provides me with an introduction to the lessons, questions to ask, and closing discussion topics. It's nice because math is not a strong suit for me."

There was not a happy medium to be found with the current textbook series in either district. Teachers using the traditional series felt that it was getting out dated and not reaching their students. Teachers using the more constructivist series liked the book because it is written out verbatim, but worried the students were not understanding the concepts. A curriculum combining both texts that include meaningful assessments meeting state standards and expectations would be ideal for all educators surveyed.

Question Four: Are manipulatives and supplemental materials provided? Do you use them?

In the districts using a more traditional series, some manipulatives were provided for the few hands-on lessons included. The more constructivist series came with numerous manipulatives. Even though these resources were provided, many of the teachers surveyed did not use them. A common response was "Yes, manipulatives and resources are provided, but I do not know how to integrate them effectively." At the lower elementary level, teachers seem to be more apt and willing to include manipulatives and supplemental materials because of the age of their students. The attempt to incorporate these resources into lessons seems to diminish greatly in the upper elementary grades. One upper elementary teacher said that they love manipulatives and would not teach fractions without them. In today's classrooms, students tend to be more visual and kinesthetic learners and manipulatives are an excellent way to address these needs.

Question Five: What would make math more fun and meaningful to you? To your students?

Making connections to everyday life was the most popular response among the teachers in all areas. Having lessons that involved real-world situations that students and teachers could correlate with out of school experiences would make the abstract concepts of mathematics more meaningful. "A curriculum with intelligible assessments and relevant math lessons that gave the teacher a better insight on student achievement would make it more meaningful to me," answered an upper elementary teacher. Professional development

workshops or training on how to best implement the manipulatives and other resources given would make math more meaningful to the educator. The confidence in their own abilities would grow and be reflected in their instruction. Viewpoints on teaching math may become more positive as well.

Putting the focus on mathematical processes and what is happening rather than getting the right answers is a progression some teachers would like to see. The students' learning would be at a deeper level and provide more opportunities for higher level thinking. With the focus on process, students learn from each other and practice their communication skills as well; which brings me to the most important distinction between traditional mathematics in a classroom and mathematics in the real world. In the classroom, students compete with each other. They do their homework on their own and take tests in isolation and are assessed on their percentage of correct answers. According to writer Kevin Delaney, "In the real world, people do not work in isolation. They work in companies and broader communities. In these communities, the ability to work with others and communicate your findings is far more important than problem solving skills. A clever solution means very little unless it adds to the broader context of the organization." As a new teacher, I provide ample opportunity for students to work with each other and explore math concepts. In the groups, I have students do jobs that are often found in cooperative lessons also giving them a sense of responsibility and accountability; two qualities important to have in today's society.

Supporters of everyday mathematics believe that this focus not only prepares students for the specific content studied but that real-world problems provide them with a bridge between the abstract role of the subject and situations they encounter as a member of society.

An important factor in the development of a student's goals must be the student's view of the nature of the mathematics to be learned, shaped partly by the perceptions of the teacher's role in the classroom. The classroom of the teacher that said math was not a favorite subject of theirs, loved that they were provided a transcript of sorts to teach math every day. When asked about the manipulatives suggested by the class textbook they said they had them but didn't know when to implement them. The students in the class were slowly taking on this negative view of math and its uses in the real world.

The View of the Elementary Student

I surveyed students at the lower and upper elementary levels with a wide range of mathematical abilities. The questionnaire consisted of four questions: (1) Do you like math? Why or why not? (2) What do you do in math class? (3) Do you use math outside of school? (4) What would make math more fun and meaningful for you? These questions were easy for the students to answer and would not make them feel as if their classroom teacher was teaching math wrong.

From the number of students I worked with in this study, fifty percent claimed that they did not like math. Their reasons were typical: it is boring, math makes my head hurt, it is just too hard. One student told me that they hated math time during the day because they never understood anything and always got answers wrong. As the students moved through the elementary grades more negative responses were given. Females at every age surveyed enjoyed math more than their male classmates. Seventy-five percent of students said that they, sometimes or always, use math outside of school when looking at the time, buying

something at the store, and when cooking. The remaining twenty-five percent never use math outside of school or only when they have math homework. There is obviously a disconnection with this group and, as an educator, I wanted to find out why they believe math is an in-school activity only. While student teaching, I have had the chance to talk with students one-on-one and get to hear more on why students are responding the way they do.

Asking a student in the below average group, “Do you use math outside of school?”

They immediately responded, “Nope, not at all. When I go to the store to buy something my mom just tells me to give the cashier the money and give her back the change.”

“When you get ready for school in the morning, do you use math then?”

“No. My alarm goes off, then I watch one show on television when I eat breakfast, and then I brush my teeth, get dressed and leave. If I'm running late, my mom tells me to hurry up.”

Asking a student in the above average group, “Do you use math outside of school?”

They thought for a minute and then replied, “I figured out how many miles my dad’s car gets for gas. And when we go to Meijer I get to see if the amount of change is right with the receipt.”

Then I continued, “Wow! You do use math outside of school. Can you tell me

about figuring out miles per gallon for your dad's car?"

"Yup. We were going to my grandma's house in Ohio and we stopped for gas before we got on the highway. The little light said 368 miles to empty…and that means when you're out of gas. So then we drove for…um, hours and I looked at the little light and it said 80 miles to empty. I asked my dad how much gas we used so far and he said that I could figure it out. He said that there were 16 gallons of gas in a full tank. First I figured out how many miles we went so far, 368-80=288. And dad said we only had 4 gallons left, so 16-4=12. Then I drew 12 circles on a piece of paper and put ten marks in each one. That's 120 so I needed more. I just kept going until I got to 288 and then counted how many marks were in each circle. I got 24."

This child in the above average category is encouraged by their parents to utilize skills learned in school and apply to every day life; whereas, the child in the below average group was not given a chance to practice and apply strategies outside of school. Students are not always given the parental support needed to enrich their learning and make the correlations between school and daily life. Teachers must do what they can to provide real-life problems to students allowing links to made.

When asking students what would make math more meaningful and fun they said to play games more often or use "stuff" to figure out problems like they have in past grades. Another request was to do math some where other than the classroom; for example the gym or outside. Students are asking teachers to use manipulatives and do the hands-on learning because that is the most prevalent learning style in the classroom. Having lessons in other

locations of the school will assist in providing the out-of-school feeling suggested by the National Council of Teachers of Mathematics.

An Attempt at Making Real-World Connections

As a student teacher in a fifth grade class, I made my own attempt at having students make real-world connections to math and find meaning and purpose in math education. I will be the first to admit it is definitely harder to accomplish with a more traditional textbook where manipulatives and other resources are not provided. I did not give up and continued to look for ideas outside of what was given. I was teaching a unit on division beginning with simple facts and ending with long division. Although my students were always moaning when instruction would begin, I remained upbeat and enthusiastic about the concept. It is important to stay positive while teaching something that may not be of interest to any of the students because they are excellent readers of body language and will take on the perceptions of the teachers, the role model.

Implications while teaching were noticeable very quickly. A third of the students have ADD/ADHD and have a difficult time keeping their attention focused on abstract topics. There were four levels of differentiation needed from me—ranging from highly advanced to extremely below average. To address the abilities of all the students, I modified lessons and incorporated a sense of layered curriculum with appropriate activities and testing. I also came up with ways to teach the aspects of division in multiple ways as to have an alternative method when one did not work. The biggest obstacle I came across when beginning to address division was the fact that only 15-20% of the students solidly knew

their multiplication facts through twelve. Division is much harder when you do not understand the topic of multiplication pictorially, concretely, or symbolically.

I centered my lessons on experiences student could relate to their own lives or have seen in other instances. From the teaching perspective, I wanted to answer four questions with each lesson: (1) What do I expect the students to learn? (2) How will I know when they have learned it [the topic]? (3) How will I respond when students do not learn? and (4) How will I respond if they already know it? I felt that if I could answer each question my range of mathematical abilities would be attended to and met.

I began each lesson with a review of multiplication through pictures, number sentences, and symbols. For the students that already knew their facts, this served as a refresher of multiplication at the conceptual level. For the students that were grade levels behind this provided a chance to see multiplication in different forms, and give the opportunity to make the connection between pictures and basic facts written in symbol form that are most common at the upper elementary level. Then I reviewed vocabulary terms crucial to learning division: dividend, divisor, quotient, per, and remainder. In past experiences, I have found that some students could not understand the directions given in activities and tests because they did not understand the vocabulary; therefore producing incorrect answers.

We started looking at division using the sharing approach. I gave scenarios in which the students were sharing cookies, toys, books,etc. with friends. They started off by representing the problem by drawing pictures and cutting them out, which addressed the visual and kinesthetic learning styles. Then moved on to writing a sentence to represent the

problem: I have six cookies and want to share them with two friends. How many cookies per child? Finally, writing the problem in symbol notation: 6/3 = 2. Instruction was starting at a conceptual level which is essential for complete comprehension of division.

After, getting a solid foundation built, we moved on to problems that could be solved by all students through methods they felt most comfortable and varied to meet their range of ability. The topic one day was a family road trip to Florida and you are driving to see the scenic route. For those at a below average level, the vehicle can get 20 miles per gallon of gas. The distance from your house to the hotel is 1200 miles. How many gallons of gas would it take to get to the hotel? For those at an average level, they were given the same information as the below average group; plus the vehicle has a gas tank that can hold 15 gallons. How many times does the family need to stop to fill up? For those at an above average level, they were given information from the last two groups; plus gas cost $2.00 per gallon. The family has taken $200 for gas money. Will that be enough for the entire trip?

With the problems centered on a topic that is relevant to their own lives, the students were eager to solve. Because I let them use a method of solving that was understood best, students were not overwhelmed and were not as quick to give up and say “I don't get it.” The class was split into groups based on ability level and given a chance to discuss together their strategy for solving. Students learn best from their peers and through a language that is natural to them.

As the instruction went on the groups were ever-changing and fluid so that it was less noticeable to the students which group was at which level of learning. I spent a week and a half of scenario based lessons before introducing the algorithms used to solve division

problems. Some of the students were able to make the connections right away and others struggled with the steps.

I divided the class into groups based on ability to complete the algorithms. For the below average group, we went back to drawing pictures and cutting them out. We wrote out the algorithm step-by-step on a poster board, taping a part of the picture at each step. This helped make the connection of what was happening at the different steps of the algorithm and provide a visual aid for the students. Then I displayed the posters in the classroom for all students to see, having the lower group explain them. The activity raised their confidence and furthered their understanding of division and the algorithms.

In the average group, I had them develop a song, chant, or saying that would help the class remember the steps of the algorithms. The results were great. One student made up karate moves to represent each step.

Divide—slash with arm on a diagonal

Multiply—cross arms

Subtract—slash with arm horizontally

Bring Down—slash with arm vertically

Expanding on the DMSB acronym above, a student remembered from a previous grade "**D**oes **M**cDonalds **S**ell **C**heese **B**urgers **S**till?" Cheese represented comparing the remainder with the divisor and still stood for starting the algorithm over when needed. The Division family was established as well. The family members included: **D**ad, **M**om, **S**ister Sarah, **B**rother Bob, **R**ocko the Retriever, and **C**oco the Cat. Rocko was for the remainder and Coco was to check your work. This group performed their sayings and movements with the class

furthering their understanding of the process of the algorithm.

In the advanced group, I had them try develop new strategies for solving division problems. They were asked to solve three problems using their strategies to see if they received consistent results and then try to find a problem where their strategies could not work. This activity got them to think on a higher level while practicing their investigating skills. Following the activity, the group shared their strategies with the class explaining why or why not they did not work. They discovered on their own that you could multiply and add or use repeated subtraction as alternative methods to solve a division problem.

At each level, the students were processing their comprehension into long-term memory while practicing other skills that are key in becoming a successful student. Having activities with varying difficulties and real-life scenarios provide the students with a chance to be successful no matter what their mathematical ability may be. Starting with real-life problems and inventive strategies and moving gradually toward standard algorithms allows the opportunity for all students to be shown both traditional and constructivist ways of instruction. As the topics are advanced, students will then have some knowledge to fall back on and to help in making further connections.

Conclusions

The achievement gap in mathematics education has fluctuated in the past and began growing again in the past decade. Research is continuously being done to find ways to better the curricula provided to teachers and students. I hope to provide my students with a fun and meaningful math curriculum that they will be able to incorporate into their everyday lives.

Effective teachers infuse their instruction with culturally relevant and engaging mathematics tasks that are rigorous, yet accessible. Evaluating the students by goals that are designed for their abilities and reasonable to obtain are crucial for success as well. Making the students feel comfortable in the learning environment and devoting time to their development of conceptual knowledge will be a great step taken in closing the gap. All classroom environments improve when teachers have high expectations for, and give strong support to all students.

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