

Living within our Budget...Economy in Life, 2009

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Introduction

As every new school year begins, I find myself frustrated with my students' lack of understanding of rational numbers. I become frustrated because I want to do more challenging projects with my students, but they do not have the basic fundamentals needed to do some of the challenging activities I would like to do. They did not learn previously required skills within the curriculum. I have found through surveys that I give my students that they have a strong dislike, no, HATE for rational numbers or math period! Through past experience, I have found that the students do not have a true understanding of place value, so I decided to create this unit plan to help students gain a working knowledge of place value. This unit will challenge even high school students to work through problem solving strategies, while learning and working with place value in an interesting and exciting new way.

Rationale

“Living within our Budget...Economy in Life” can be used to help students see a real world application as to how math is used in the “Real World”. This unit is made of lessons and activities that will help them to prepare for day to day living, while showing them how mathematics is used in real life. There are many careers in the world today that require the knowledge of mathematics. Some careers that involve mathematical knowledge include but are not limited to architect, cosmetologist, graphic designer, chef, computer programmer, financial analyst, construction worker, cryptologist, baker, attorney, artist, statistician, robotics engineer, doctor, actuary, astronaut, painter, nurse, and ecologist.

The Economy in Life unit is designed for 7th through 10th grade, to help ensure that they have enough financial literacy to be economically sound. The unit will take approximately 15 days. Showing students a connection between mathematics and the outside world allows for the students to see the relevance in mathematics. When students are enlightened as to how they will need mathematics to live day to day, they may have more of an interest to learn mathematics and to be successful in it. This unit will provide students with “hands-on” activities that will simulate actions they will use in their lives as they become adults and are living on their own. The unit will also provide questions to get students using their problem solving strategies which is an area that many employers

need their employees to possess. Chapter nine of “Overcoming the saving slump: How to increase the Effectiveness of Financial Education and Savings Programⁱ” by Lewis Mandell states:

Students completing high school are on the verge of adulthood and many have made or are making important financial decisions, such as the choice of credit cards, auto insurance, and student loans. The recent turmoil in the student loan market appears to suggest that many young people had little or no understanding of the contracts they undertook and may have been misled by those whom they trusted.

In the Journal of Consumer Affairs Winter 2001ⁱⁱ addition, Sharon Tennyson and Chau Nguyen stated that “In 1997 and again in 2000, the Jumpstart Coalition for Personal Finance Literacy administered a test of financial literacy to high school seniors. In 1997 students correctly answered only 57 percent of the questions on average, and in 2000 students averaged only 52 percent correct. These findings, coupled with Americans’ low rates of saving, heavy use of credit and high rates of bankruptcy, have fueled public concerns that teens need educational preparation to successfully manage their finances in adulthood.”

Even though I care for my students, I have difficulty motivating them. I have found that many of my students and their parents do not appear to have a high value on education, which seems to cause low performance in the school. The students have a nonchalant attitude about school, homework, and little respect for teachers and staff. The disrespect and lack of motivation to get an education often lead to behavior problems and class disruptions. When the class is in disarray, no learning can take place. I believe that when a student cares about the teacher, or has fun in a class, their attitude and behavior will change for the better. They work hard and they put forth an effort to do well in the class. If, however, the class is not “entertaining” or the student does not like the teacher, then the behavior and attitude becomes negative toward the class. This unit is a way to “hook” the students and teach them at the same time. It allows for investigative work and some real world application. I plan to implement this unit with my current students in hopes to “entertain” the students, and receive that positive behavior and attitude I desire in the class, while also teaching them the basic fundamentals of place value, percents, and interest. I believe that this unit will “reach” the students, because they can relate to how it is really used in life. Often times, teachers use examples that many urban students will never experience. The activities in this unit are common to any culture and are important to all cultures.

Many of my students hate math, but the question is why do the students hate math? Sometimes the students carry a dislike for math, because in previous years, they did poorly, the teacher did not explain it well enough for them to understand, or they did not get along with the teacher. Most often I believe it is because the students do not have an

understanding of the vocabulary or the basic fundamentals of math. When students do not understand something, they tend to get frustrated and consequently dislike it. When they get frustrated, they give up and build a wall, which is hard for teachers to break down early in the year when students are still reviewing material from the year before. Rational numbers and operations with rational numbers are basic fundamentals upon which all areas in the eighth grade curriculum, and curricula beyond the eighth grade build. Many students have difficulty working with different types of rational numbers. They try to memorize certain numbers or how numbers in a certain set look and do not try to understand the concept and learn the definition of the different sets. More specifically, many students fail to understand operations with rational numbers, therefore, this unit will focus on teaching operations with real numbers and showing how we use arithmetic to live within our budget.

It is important for students to have financial literacy. As I have talked with other teachers, I have found that many students are low readers and are low achievers in math too. I believe that they are low in math because they do not understand the vocabulary, which goes back to them being low readers. Unfortunately, if they can not do basic fundamentals, and can not understand their finances they will have a difficult time being successful in life and will have some money trouble when they are living on their own. Their parents' lack of math and financial understanding trickles down to them, especially if they do not get the knowledge at school. It is important for students to understand how to make a budget and how to stay within their means. Some students don't really understand how credit cards and checks work. Many of the students see poor spending habits at home or learn poor spending habits from advertisements. They seem to see it as free money, as though they don't need to have the cash, just charge it or write a check. Through this unit, the students will become educated on these different areas, but before they can do any activities they must be able to understand place value and be able to complete operations with them. However, many of my students have such a difficult time understanding place value. Yes, eighth graders do have a difficult time truly understanding place value. In order for students to gain a working understanding of budgets and financial literacy, I created this unit on teaching place value.

The Economy in Life Unit is intended to show how mathematics is used in life, as well as how to use the different operations based on the real life topics by teaching my students place value, percentages, and interest. The unit will include higher level thinking questions and problems to encourage a deeper thought process and understanding of mathematics through economy in life. This unit will include three activities, a budget activity, checkbook activity, and an activity that focuses on life choices, and will also include three lessons that will focus on place value, percents, and interest. Not only will the students learn the material necessary to build upon for their understanding of the curriculum, they will also learn skills necessary to be successful in life. Some of the skills they will learn through the unit are research skills, check writing skills, organization skills, and problem solving skills. This unit will also shed light into

their future. Encouraging the students to think ahead about where they want to be, where they are going, and what they need to do to get where they want to be.

The ultimate goal for this unit is to teach students a fundamental understanding of rational numbers, through the learning of place value, while giving them some life lessons. As a result, students should be able to complete operations with rational numbers, including integers, decimals, and fractions. Students will also come away for this unit with an understanding how checks work, how to write checks, how to keep a transaction register, how interest (both simple and compound) works, and that they need to make some short and long term goals in order to be able to have the things they want in their future.

Demographics

I am a teacher in an urban district in North Carolina with 132,632 students in 174 schools. The school district is split into learning communities, of which my school falls into the West Learning Community that serves 17,096 of the total school district population. The school in which I teach educates 1,138 students. The student population is approximately 60% African-American, 21% Caucasian, 11% Hispanic, 4% Asian, and 4% multi-racial. 62% of the students at our school are also students who receive free or reduced lunch. The school in which I teach works on a block schedule. There are four blocks per day each lasting about 90 minutes and out of those four blocks, I teach for three of them.

My first block consists of 27 students, of which 11 of them are female and 16 are male. 17 students are African-American, 3 are Caucasian, 1 is multi-racial, 3 are Asian, and 4 are Hispanic. Thirteen of my students in my first block are economically disadvantaged. This class is a regular education class where 14 of them were on grade level mathematically coming into the class, while 12 of them were not. When a student is considered to be “on grade level” the student is considered to have mastered the previous year’s curriculum. A student who is on grade level is ready to learn new material. However, with only half of the class on grade level, many of the students did not master the previous year’s curriculum, so in order to learn the new material I have to teach, or provide an in-depth review of the previous year’s curricula that are prerequisites to the 8th grade curriculum.

My third block class is an inclusion class. An inclusion class is a class that consists of exceptional children and regular education children, and includes a regular education teacher as well as an exceptional childrens' teacher. Unfortunately with budget cuts, the inclusion teacher only comes into the class every other day, as opposed to coming in every day. The inclusion teacher is also more of an assistant instead of a co-teacher, which I believe is the way the inclusion model best works. Within this class there are 17

boys and 9 girls, of whom 18 are African-American, 6 are Caucasian, 1 is multi-racial, and 1 is Hispanic. Eighteen of these students are economically disadvantaged and 7 of them are labeled exceptional children. Since this is an inclusion class, many of the students are below grade level and 7 of them are identified as exceptional children. There are 15 students that are below grade level and 11 students that are above grade level in mathematics. Since more than half of the students are below grade level, it is extremely different compared to the other two classes in regards to the learning environment and the understanding within the class. The learning environment must move at a slower pace and there is a high level of difficulty based on limited prior knowledge and experience.

My fourth block is my Algebra class and is considered an advanced class. The students are given high school credit as long as they pass the class and the End of Course test at the end of the year. This class make-up is 9 boys and 15 girls. 6 of the students are African-American, 12 are Caucasian, 2 are multi-racial, and 4 are Hispanic. Nine of these students are economically disadvantaged, while the other fifteen are not. Since this is an honors class, all of the students are above grade level in mathematics. It is important for me to ensure that I challenge these students. Often these students are the ones who show the least growth on their EOG's each year, but I believe with some challenges and encouraging higher level thinking their scores will enable more growth. It is sometimes difficult to challenge the student, but I try and find alternate ways of differentiating lessons to include higher level thinking.

Lesson One

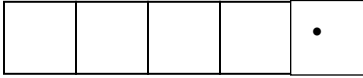
Before students begin the first activity, it is important for students to understand decimals. They need to know how to add and subtract decimals, but before they can complete any operations students need to understand place value. This first lesson is created to ensure students understand place value, which will allow them to understand how to add and subtract. Once students have an understanding of place value, they will learn how to add and subtract using their knowledge of place value to help.

The first lesson of the unit is "Exploding Dots". This lesson will show students how the base ten system works, by using an entertaining method through the use of explosions. The students are introduced to the exploding dot procedures by working with the 2-to-1 dot process. Have the students write five adjoining boxes on their paper, like this:

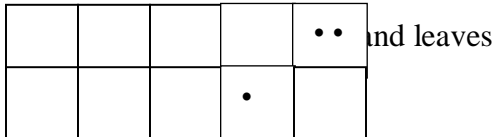


Explain to the students that they will begin at the furthest box to the right, by placing one dot in at a time. When two dots occupy the same box, an "explosion" occurs erasing the two dots in the box and creating one dot in the adjoining box to the left.

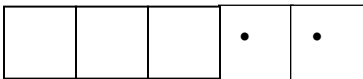
1 dot



2 dots (or the number 2)

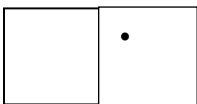


The number 3 would then look like:

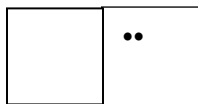


You can have the students explore this exploding dot method by giving them some numbers to try on their own. After you believe they understand how the exploding dot method works, you can allow them to try the 10-to-1 method. This beginning presentation of exploding dots will take one day to do. In this activity we begin with the same number of boxes, but let the students know that they can always add boxes. In the boxes, we are going to place dots again one at a time. When a box gets the tenth dot, the box explodes the ten dots disappear and one dot is created in the box to the left. After doing a couple of examples of how the exploding works.

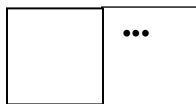
1 dot



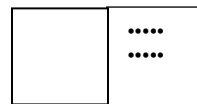
2 dots



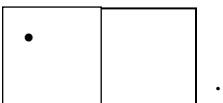
3 dots



to 10 dots



which makes an “explosion” and creates

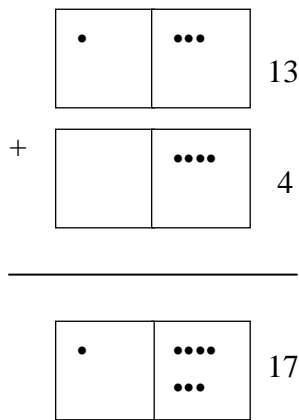


Then show how a number would look in the box and give an explanation as to why it looks as it does, just as you did in the previous 2-to-1 method. Ask questions to get the students thinking about connections to topics they have learned previously (either in your class or earlier years). The goal is to get a connection to the base ten system. Once the students have a good understanding of the base ten system, they can explore adding and subtracting using the exploding dots method.

On following day, the students will learn to complete operations using the same exploding dot procedure. The teacher will need to explain “antidots” that will denote negation when working on subtraction problems. It is important to link this exploding dot topic to their understanding (limited or not) of place value.

To add numbers using the “exploding dots” method, students first need to create boxes to represent the numbers they are adding.

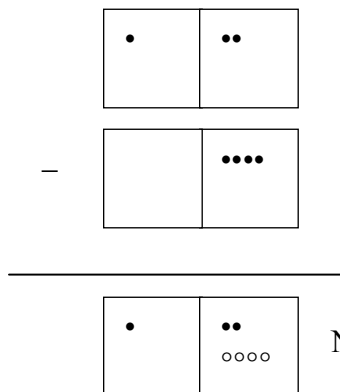
Ex. $13 + 4$



So the answer is 17. Once the students understand the addition of simple numbers, the next step would be to give an addition problem where an “explosion” would need to occur, such as $12 + 8$. The class can then make conjectures and connections to how they were taught to add numbers and how the idea of “carrying” works with the exploding dots method.

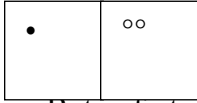
To subtract, students should first learn about “antidots”. The “antidots” are going to represent negation. In addition to “antidots”, students will also experience the idea of borrowing with the exploding dots.

Ex. $12 - 4$

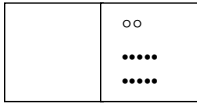


Notice there are 4 “antidots” in the same box as 2 regular dots.

Just as with integers and one positive and one negative, one “antidot” and one regular dot cancel each other out, or equal zero. So what you have left is:

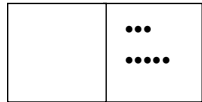


But unfortunately, you can not leave “antidots” in the box. We have to “unexploded” the dot in the left box, reminding students that one dot is equal to 10 dots to the box to the right. Now what we have is:



. Again, we have “antidots” with regular dots, so we have to cancel.

And our answer becomes:



or 8.

Have the students explain how the idea of subtraction with “exploding dots” compares to the previous learning of subtraction and borrowing. Then the students can work on some problems on their own to make sure they understand the operations and how it compares to adding and subtracting numbers with out the exploding dots.

If a class or student is really interested in the exploding dots method and would like to be more challenged they can explore more difficult systems such as:

- 2-to-3
- 2-to-(-1)

In exploring these systems, the students can write how the first 10 (or whatever) numbers may look.

One activity that can be used in addition to the “exploding dots” lesson is called “Checking it outⁱⁱⁱ”. It is a small activity where students go through a fictional person’s daily activities and expenditures. The students must write checks to different agencies to pay bills and then they must keep a transaction register, which is a log of their daily transactions. It should be explained to the students that checks are a way to help document when a bill was paid and for how much. The transaction register is to help a person know how much money they have in their account at any given time. In this activity the transaction register will be used to determine how much money the fictional person has at the end of the activity.

The students will learn about withdrawals and deposits, as well as about how to write a check. Along with this, students learn the process of how the banks work in regards to checks and what happens when people don’t have enough money in their account when

they write a check. This activity can always be extended with adding deposit slips and questioning students as to how the banking system has changed over the years and where they see it heading. The teacher can explain how checks used to take 10-14 days to “clear” and now it can almost be done in a day or two. In addition, the discussion can lead to students understanding that using a debit card is similar to writing checks in that they receive a receipt for the debit transaction and they still keep a log so they know how much money is left in their account.

Lesson Two

The second lesson is on percents. Percents are used in the “real world” in many different aspects. Percents are used in banks, stores, and statistics. It is important for students to realize first what percentage means and then how to use it in different situations. In this lesson, students will learn the meaning of percentage and then in the subsequent lessons how to use it.

A percentage is a part of one hundred. If students have learned about fractions previous to this lesson, it will be easy to connect this idea to fractions, since fractions are usually a number used to describe parts of a whole. The difference between a fraction and a percentage is that the denominator in a fraction can be any number, but the denominator of a percentage is always 100. The denominator in the percentage fraction will always be 100, but the numerator can be less than, greater than, or equal to 100. Once students can grasp this meaning, it then is time to show the students how to change from a percentage with the percentage symbol to a fraction and a decimal. Students like to know why they are learning different topics, especially in math, since they don’t see a reason for learning the topics they don’t like. Students do not want to waste their time learning things they will never use! Explain to the students that they will use the percentage as a fraction to work with the percentage equations, and they will use the decimal form of the percentage when you learn to take the percentage of a number. These are two different methods of helping to find percentages and will be used in finding the interest, taxes, and percentage mark-ups and discounts used in the “real-world”.

First, show students how to take percentages and change them to fractions. If you had 45%, students take the number 45 and place it over 100 and create the fraction $\frac{45}{100}$.

Allow the students to do a few of these on their own. Include numbers that are more than one hundred, less than one hundred, and some with decimals. Teachers should explain the importance of simplifying fractions. Part of simplifying a fraction is ensuring that the numerator is not a decimal, so it will be important to change any fraction that has a decimal in the number so that there is no decimal in the numerator. For example, if the

problem were to change 38.4% to a fraction, students would make the fraction $\frac{38.4}{100}$; however a decimal in the numerator is not acceptable. Students would then have to move the decimal in the numerator to the right one place, the reason because you multiply by 10. If the students have worked with fractions and creating equivalent fractions before, then they know that when you multiply the numerator by a number you must also multiply the denominator by that same number, so the fraction then becomes $\frac{38.4 \cdot 10}{100 \cdot 10}$ or $\frac{384}{1000}$. Then the students continue simplifying until there are no more factors in common between the numerator and denominator.

After the students have shown an understanding of changing percentages to fractions, then teach the students how to change the percentage to a decimal. Explain to them that when you put a percentage in fraction form it is an expression of division. In Roger Howe's Essay "Taking Place Value Seriously: Arithmetic, Estimation and Algebra^{iv}", Howe explains that fraction notation expresses numbers as a result of a process of division. Since a percentage is a number out of 100, then when you put the percentage in fraction form you have a denominator which is 100 or a power of 10. In the example 45%, the fraction form would be $\frac{45}{100}$. If we were to write this fraction using exponents we would get $\frac{45}{10^2}$. In understanding exponents, students should have a working understanding of negative exponents and would know that $\frac{45}{10^2} = 45 \cdot 10^{-2}$. If we were to write this in standard notation, our final answer would be $45 \cdot 10^{-2} = 0.45$.

Once students are given a number of examples to try, they should be able to see a pattern of what happens to the percentage when it is changed to standard form or decimal form. They should notice that when you take away the percentage symbol you must move the decimal two places to the left. If the students compare the fraction from the example earlier to the decimal in this example, they will see that the two are equivalent. Give the students some examples to try, again with percentages greater than 100, less than 100, and some with decimals (like 36.7%).

In the next three days of this lesson, the teacher will explain how the understanding of the meaning of a percentage is put into use. Students will learn how to find the percentage of a number, how to find the mark-up and discount of a number, and how to find simple and compound interest. Finding percentages of a number are prior knowledge skills needed for mark-up and discounts and finding interest. It is important

for students to get a good understanding of finding percentages of numbers before moving on to the next lesson.

Following the previous activity students will be finding missing pieces of the percentage equation. The three types of percentage equation questions that students should be able to answer are x is what percentage of y , what is x percentage of y , and x is y percentage of what number. For the first type of problem, x is what percentage of y , we would set up a proportion. In the proportion you would have three known numbers and one unknown number. The three known numbers are x , y , and 100. For this problem we will use n as our unknown. Students need to learn to read and determine where each of the numbers belong in the proportion. As we mentioned in the previous lesson, percentages are parts of a whole. So we have to find out what two numbers represent the parts and what two numbers represent the whole. We automatically know from the understanding of percentages, that one hundred is one of the numbers that represent the whole, so we just need to determine where the other numbers go in the proportion. So in the type of problem x is what percentage of y , we can set up the proportion $\frac{x}{y} = \frac{n}{100}$,

where x is the part, n is the missing percentage, and y is the whole. To solve for n , students would conduct cross products. Multiply y and n and make that product equal to the product of 100 and x . The students then solve the equation to find n .

The second type of problem, what is x percentage of y , students should realize that you still have three known values and one unknown. The three known values are x , y and 100. The unknown value would be n , which in this case represents the part. The

proportion would be set up as follows $\frac{n}{y} = \frac{x}{100}$, where x is the percentage, y is the whole, and n is the missing part. Again to solve for n , students would have to use cross products, and set the product of y and x equal to the product of n and 100. Solve for n to get your unknown value.

The third type of problem, x is y percentage of what number, again has three unknown values and one known value the same as before. The proportion that would be $\frac{x}{n} = \frac{y}{100}$, where x is the part, n is the missing whole number, and y is the percentage. To solve for the missing whole number, the students would again use cross products. Set the product of n and y equal to the product of 100 and x . Then solve for n . Give students some practice on the three types of percentage equations, and then give the students some “real world” word problems, so students can see why they need to learn how to solve percentage equations. These problems can be taken from different math contests where they include challenging but relevant word problems. Not only will the students see how

the math is used in the real world, but the students will also work on their problem solving skills to answer the challenging questions.

In this next part of the lesson, students will learn about mark-up and discount. Most if not all of the students have paid for something in a store where they were charged tax. This mark-up and others are important for students to know how to calculate. In addition, discounts or sales are important to know how to find as well. We don't want the students to be taken advantage of because of their lack of knowledge.

The first type of questions that I will discuss is mark-ups. As an the example, Joe's wholesale buys t-shirts at \$10 each, but wants to sell them with a 25% mark-up, at what price does Joe's wholesale sells the t-shirts? The students must first find out what 25% of \$10 dollars would be, which is what they had learned in the previous lessons. So they should know to multiply 0.25 (the decimal form of 25%) and 10. The product \$2.50 is not the price of the t-shirts, as that wouldn't make sense; it is however, the amount of the mark-up. The students would need to add this \$2.50 mark-up to the original price paid for the t-shirts. The sum of \$12.50 would be the price that Joe's wholesale would sell the t-shirts.

Once the students understand mark-up, it is then time to teach them discounts. To begin, you can ask the students what they think are the differences between mark-ups and discounts. Once they have determined that the only difference is that there is a number added to the original for a mark-up and an amount subtracted for a discount, you can then show them how that works in the two types of problems. With a discount type problem, such as Mack's Department store has \$49.95 jeans on sale for 25% off, what is the sale price of the jeans? The students would begin by determining what 25% of \$49.95 is. This result found by multiplying 0.25 by 49.95 is the amount of the discount. The students should then be taught to take the amount of the discount, \$12.49 and subtract it from \$49.95. This amount of \$37.46 is the sale price of the jeans. Once students have learned both mark-ups and discounts, students can learn to do more than one of them at a time. You could have a problem where there is an item on sale and then has tax added to it to find the total cost paid for the item. You could have an item on sale and then the customer also has a coupon for an additional discount, or a problem where a store buys an item, marks is up 20%, then puts it on sale for 20% off. With this last problem, the teacher could ask the students if they think that the price would go back to the price paid for the item or if it would be different.

The activity to use in conjunction with or at the end of the lesson on percentages would be the activity called "Life is Expensive[™]", which is a simulation where students plan their life and use their choices to determine their income and expenses. They first have to choose a career. What they find out though is that the career choices are dependent upon their previous year's grades. They find that the better their grades were in the previous year, or a better education, leads to more career choices they will have,

while those students that had low grades are limited in their choices. Once they choose a career, they need to decide whether or not they would like to be married or have children. With their total monthly family income dependent upon whether they are married or not and what type of career they have, the students are then asked more questions. The students will be given options on housing such as whether they are going to rent or own and what size, what size cable package, whether they would like to buy a new or used car, do they want a cell phone and or a house phone, and even how much, if any, money they would like to donate to charity.

Many students have a difficult time when they must calculate their taxes, but in this simulation they get a taste of the real world. Students must also pay utilities and for insurance. Towards the end of the activity the students roll two dice to determine their “wildcards”. The “wildcards” are chance happenings where the student may have to pay an amount of money and they will include this into their expenses or they will receive money and include this as part of their incoming funds. Once the students have determined their income and their expenses, they will then fill all the information into a worksheet. Based on their choices, students determine whether their career choice can sustain all of the other decisions they made. Many students notice that they do not have enough money to live the lifestyle they chose.

My past students have used this information to change some of their attitudes towards school. The students realize that the choices they make now can determine how their life will be in the future. They begin to make better decisions, so they are not stuck with limited career choices. I also believe that this project will help them make informed decisions about life and encourage them to set high expectations for themselves, so they are not stuck living a life they do not want. In this activity, it shows them that being an adult is not always so “fun” and that there are boring things that adults have to do. Students also find that there are a lot of decisions that adults must make that children do not know about and that sometimes they ask for things that put their parents in a difficult position. My hope is that students become more appreciative of their things and are more mindful of the material items that they may ask for from their parents.

Lesson Three

The last lesson in the unit will be on interest. The teacher can begin with simple interest and then for a challenge lead into compound interest or just teach simple interest and discuss how this leads or builds up to compound interest. Another discussion topic would be how interest is used in banking with mortgages, auto loans, and credit cards. The information on mortgage and auto loans will be used in the final budget activity at the end of the unit.

Simple interest is found by using the formula $I = prt$, where I represents the interest earned, p is the principal amount invested, r is the interest rate, and t is the time in years the interest will be calculated. As an example, consider the problem Suzie put \$5000 into a savings account at a 6% interest rate. How much interest would she earn in 3 years? The students would substitute 5000 in for p , 0.06 in for r , and 3 in for t . Notice again students are using prior knowledge from previous lesson on how to change percents to decimals. You can also give examples where the students must find out how much she has in her account. In this type of problem, students would have to add the interest, I , to the principal amount, p , to find the answer. To ensure that students have an understanding of simple interest problems, the teacher can have the students find unknowns other than the interest. The teacher can give problems where the students must find the principal amount, the number of years, or the rate, given the other three.

Since most banking loans follow a compound interest formula, it would be more beneficial for the students to get a true sense of the budget activity if they were taught and learned how compound interest works. One way to introduce compound interest is to bring in someone to talk to the students. The students could also be asked to interview their parents about their car or home loans to see what they can find out about interest. It would be interesting to see how many parents do not know how compound interest works or how to explain it to their child. Either way, these methods can lead to the introduction of compound interest, as well as where and how it is used.

The last part of the lesson before the final activity is on compound interest. Compound interest is more challenging than simple interest, so it is important for students to understand simple interest before moving on to compound interest. In compound interest, students should learn that an additional value is accrued and added to the principal amount. When you borrow money from the bank to buy an automobile, a house, or for student loans, you are also asked to pay interest. This interest, or amount of additional money added to the amount of the original loan, is a fee set up for the bank lending you money. Interest could also be received, instead of paid, if you invest your money. This interest is calculated as a percentage of the principal, or initial, amount borrowed or invested.

The first step of the compound interest would be to start with the interest being calculated and compounded yearly. The formula for this would be $A = P(1+r)^t$, where A is the total amount paid back (or received), P is the initial amount borrowed or invested, r is the percentage rate expressed as a decimal, and t is the number of years the money is borrowed or invested. Give the students some examples of how the total amount would be calculated with some given information. Then take the lesson to the next level. Explain to the students that sometimes the interest is calculated more than once a year. In

this case the compound interest formula is $A = P\left(1 + \frac{r}{n}\right)^n$, where A is the total amount

paid back (or received), P is the initial amount borrowed or invested, r is the percentage rate expressed as a decimal, n is the number of times the interest is calculated per year, , and t is the number of years the money is borrowed or invested. Once the formula is explained, the students can apply the formula to some “real-world” examples. In the examples, include different ways in which the interest could be calculated such as semi-annually, or monthly. In teaching the students about compound interest, the ‘rule of 72’ can be introduced. The ‘rule of 72’ tells how long money will double with a certain rate. The ‘rule of 72’ is the rule realtors use to help them to understand the compounded interest over a long period of time.

In this final lesson students can end the unit with an activity called the Budget Project. This project requires the students to do research on a career that they would like to pursue. This activity could be one that is used with a language arts class. Students should be taught how to conduct research. If all teachers show the students how to complete research, they will become more independent workers. Many of the students look to their parents and teachers for answers when they can find the answers themselves. In researching their career, the students will look into what they need to do in high school to begin their eligibility for the career choice. For example, they need to know what type of classes and what GPA they may need. To find this information, the students must look at their career choice determine what schooling or tests are required and what requirements are needed to attend the school or to take the test. The students must also identify ways they can pay the cost needed to attend any schooling or to take any required tests.

Once the students have researched their career, they can find what an entry level person in that career would make. From this information, students will calculate their monthly income and then research the choice of transportation. They will determine if they would like to buy an automobile or use public transportation. With either choice of buying an automobile or taking public transportation, students will be required to calculate their monthly expense on their mode of transportation. If they choose to do public transportation, they must determine how much money they will spend monthly. If the student instead decides to buy an automobile, they must calculate how much it will cost them per month will the loan of their car having compound interest added.

After they have found themselves transportation, they must choose their housing. The choice would be whether they would like to live in a house or rent an apartment. Their decision determines what they will do next. If they would like to rent an apartment, they must research different apartments in their city of choice and determine the best apartment for their money. Students should research crime rate in the areas to determine if the area they chose is safe or not. If the student chooses to buy a house instead, they must calculate the monthly cost after interest is compounded.

Based on their housing decision, they must research what addition bills they would need such as electricity, gas, water, sewer, or phone. Students must also include entertainment costs, clothing costs, and food costs.

Once they have done all of the calculations and made all of their choices, they must make a log of what their income would be as well as all of their expenses. They must write checks to pay their bills and they must create paychecks to show their income. They must show this information for a year long period. There will be some chance happenings that the students will also receive, as in life something always comes up! This activity is a combination of research and the first two activities.

Conclusion

The purpose of this unit was to not only teach students about operations with rational numbers, finding and using percents, and understanding and implementing interest, but also how these topics are used in the real world. All teachers need to help students prepare for their future. The area I chose to help students with in this unit was financial literacy. I don't believe students will master financial literacy from this unit, but I do believe it is a start.

Annotated Bibliography

Howe, Roger. "Taking Place Value Seriously: Arithmetic, Estimation and Algebra." (2008): 1-45.

This essay explains a method to teach students place value.

Instructional Fair. Math for the Real World. TS Denison, IF2560.

This Activity booklet contains the activity "Checking It Out" used in the unit.

Mandell, Lewis. "Financial Education in High School," in *Overcoming the saving slump: How to increase the Effectiveness of Financial Education and Savings Program*, edited by Annamaria Lusardi, 257-279. Chicago: University of Chicago Press, 2008.

The authors have compiled a book where each chapter deals with Financial Education. This may help with any discussions used in class on the topic of financial literacy and education.

Rouse, M.S.Ed., Bob. "Life is Expensive!."

http://www.nieteacher.org/nie2/_KRP/tabs/sec/Life_is_Expensive.pdf (accessed June 15, 2009).

This is the website for the "Life is Expensive!" activity used in the unit.

Tennyson, Sharon., Chau Nguyen. "State Curriculum Mandates and Student Knowledge of Personal Finance," *Journal of Consumer Affairs* 35, no.2 (2001), http://findarticles.com/p/articles/mi_hb3250/is_2_35/ai_n28879114/?tag=content:coll (accessed October 9, 2009).

This article states some facts on student financial literacy and understanding of personal finances.

i Notes

Mandell, Lewis. "Financial Education in High School," in *Overcoming the saving slump: How to increase the Effectiveness of Financial Education and Savings Program*, edited by Annamaria Lusardi, 257-279. Chicago: University of Chicago Press, 2008.

ii Tennyson, Sharon., Chau Nguyen. "State Curriculum Mandates and Student Knowledge of Personal Finance," *Journal of Consumer Affairs* 35, no.2 (2001), http://findarticles.com/p/articles/mi_hb3250/is_2_35/ai_n28879114/?tag=content:coll (accessed October 9, 2009).

iii *Instructional Fair. Math for the Real World.* TS Denison, IF2560.

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