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EDUC-210

Curriculum and Pedagogy Proposal

In a multicultural classroom all student will engage in class discussions by using critical thinking and analyzing the different perspectives laid out by the teacher. In every classroom the teacher will adhere to state standards through hands-on learning and active participation. Every one to two weeks there will be a new theme created that will bring the school together across subject and across grade level. However, throughout the year the main focus of our curriculum will be based off of and connected to the civil rights figure, Robert Moses (Lopez,2010). Empowering the students through the teaching of Robert Moses novel, Radical Equations, and by having students take the responsibility of their own learning. Multicultural education will give the students the ability to achieve academic success and higher education, which is not only possible but will be attained.

In this proposal I am going to implement the goals of this school and the New York state learning standards that will be achieved in the specific academic area of Mathematics in the 8th grade, specifically Algebra. However, I will show how topics that will be learned in Math can be taken across curriculum and implemented into every classroom changing it to fit that specific subject. Curriculum must adhere to state standards however implemented in a creative way. The overall goals for all mathematics classes are as follows, "Students will: understand the concepts of and become proficient with the skills of mathematics; communicate and reason mathematically; become problem solvers by using appropriate tools and strategies; through the integrated study of number sense and operations, algebra, geometry,

measurement, and statistics and probability"(State Standards). At my school all these goals will be implemented and achieved through hands-on learning and active participation with continuous assessment through summative, formative, and portfolio assessment.

To show how all these goals are going to be implemented in the curriculum I am going to focus on a specific two-week lesson plan that will apply all the different aspects of the learning objectives for this school. This lesson plan is for Algebra grade 8. Time required to teach each lesson will be split up over a week or week and a half period. All these lessons stick to the mathematics state standards for the eighth grade.

Skills Acquired:

- Analysis of data
- Critical thinking
- Graphic representation of information
- Collaboration
- Brainstorming
- Information gathering

Title: Going from lines on a graph to real-world applications

Introduction: Many people do not think that you will ever use Math in the real world. However, this week you will prove this wrong. In about a week we will learn how to break our single-step and multi-step equations into different parts that we can graph. Once we have mastered graphing and the different types of graphs we will move into applying what we know into the real world. You will be given sets of data and word problems, which you will graph and then analyze the data to make a real-world decision. The reason why this should be learned is because collecting, comparing, and analyzing data actually do happen in real-world situations such as buying a car, comparing prices on food items, comparing job salaries, or picking

which stock to invest in. All of these skills are important and necessary for the future.

Learning Objectives:

After completing this lesson, students will be able to:

- Identify the different parts of an equation that you need to graph any lines
- Define the vocabulary of graphing
- Translate the equations into graphing slope intercept form
- Apply their knowledge of graphing slope intercept form to a real-life situation
- Analyze sets of data to come to a conclusion

Subject Areas

- History
- Art
- English
- Science

Time Required

Lesson 1: 1 class period
Lesson 2: 1 to 2 class periods
Lesson 3: 2 to 3 class periods
Lesson 4: 1 to 2 class periods
Extending the lesson: open ended

Guiding Questions:

How do these numbers in an equation mean anything? Have you already heard of any vocabulary that you think relates to equations and graphing? How can graphs relate to the real world? Even though graphing relates to the real world am I actually ever going to use it in the future for making decision?

Preparing to teach this lesson:

- Research mathematicians for this specific unit and give a list to the student presenter(s).
- Review chapters on graphing in Prentice Hall Mathematics: Algebra 1 by Pearson
- Prepare daily math minutes on the material from previous class

- Prepare sufficient copies of Point Plotting handout(Figure 1), Class notes handout, Algebra Homework #15(Figure 2), Academic Lyrics Worksheet, Algebra Homework # 17(Figure 3), Slope VIP(Figure 4), Algebraland Story(Figure 5), Algebra Homework #19(Figure 6), Cell Phone Company #1 and #2(Figure 7), Algebra Homework #21, Rocket Analysis, Algebra Homework #22
- Get rockets from RAFT and test them before lesson
- Paint target posters
- Create scavenger hunt of graphs
- Extra copies of Multi-step equations VIP
- Materials needed: chalk, markers, colored pencils, clipboards, target posters

Suggested Activities

Lesson 1: **History in Math(1 day)**

Each new unit a student will give a presentation about a mathematician that has to do with the unit that we are covering in that unit. For example, in this unit a student could focus on Muhammad ibn Musa al-Khwarizmi because he wrote a book in Arabic about algebra, specifically balancing equations, which is needed in graphing. These presentations can be given in any group size ranging form 1-4 students depending on how many units and presentations you would like each student to give. These historical mathematicians also can relate across subject area to history and art. In history they could be studying the Arabs or the religion of Islam and in Art students could be looking at Islamic art. Also having students give

presentations from an early age helps them with their public speaking skills, which is much necessary in all years of education and life.

After the presentation, if students have time and access to technology they can retrieve more information about this specific man in groups and at the end of class everyone can come together and share what they found.

Lesson 2: Plotting Points(1-2 days)

At the end of this lesson students will be able to identify parts of a graph by using correct vocabulary and plot points onto an xy-axis.

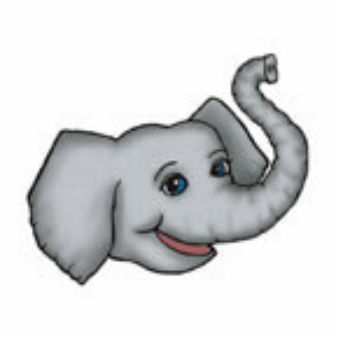
In this lesson discuss how the xy axis is like a crossroads and how whichever direction you pick there will be positives and negatives. Have the students share a crossroad that they have been at and describe whether there were all positives, all negatives or a mix of both and then on the board plot them in a quadrant where they decided to go. By starting with this discussion it can lead into the different parts of a graph. Keep the graph of there decisions up on the board and have them come to the board using different colors to label the graph with the different vocabulary: x axis, y axis, coordinate plane, origin, quadrants, coordinates.

To get up and move take them out to the blacktop and have someone draw one big axes that are labeled then have another student draw a line where directed behind the axes. Once every student is behind the line you will call out: “Jump on one foot to quadrant 3” or “put your finger on the origin” the last person to get there will do five jumping jacks. This creates a hands-on, fun learning environment and helps get the students out of the classroom. Also, this is a good way to assess your

students by seeing who is struggling figuring out where the given place they need to go is.

After that activity it is time to go back in the classroom and do some more activities, structured, and guided practice. Once they have the basic vocabulary down see if they can figure out the point that they are at with the decision they chose on the graph. This will help relate it back to their own life experiences and the perspective of the decision they are thinking about.

Another fun activity you can apply to your class is plotting points. On the Plotting points handout there are a set of points that the student has to follow and connect the different coordinates in order. These points can turn into anything like



an elephant. Then the students can color them in class or for homework. You can have a competition for the best drawing and hang them up in the classroom. Displaying student's work not only creates a better learning environment but also empowers students and shows them everything they have accomplished throughout the year.

As a ticket out the door the student must tell the teacher one part of a coordinate plane, which is always a good short assessment to figure out if they retained anything from the class or are struggling with the vocab.

Lesson 3(2-3 days): Graphing in Slope intercept form

After this lesson students will be able to apply solving for multivariable equations to linear equations in particular slope intercept form. Using the Math Minute, which should be on solving multivariable equations, the students will

review how to solve these equations by looking at their Visual Instructional Plans (VIP) on multivariable equations. Visual Instructional Plans were created by Fred Jones along with “Say, See, Do” teaching, which is mentioned later.

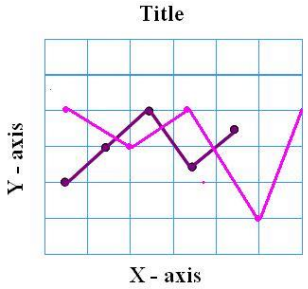
Plugging in values is a basic skill that the students need to learn before moving onto graphing the actual equations. To learn how to plug in values, start at the basics by plugging in something that they like. Have them choose a symbol that represents them like a Christmas tree, a smiley face, or a sad face and ask them to explain why they chose that symbol. Then by choosing that symbol teach them how to plug it in and manipulate the equation. Once they understand the art of plugging in symbols they are ready to move on to numbers.

Independence and dependence can again be connected to their life and across subject areas. These two vocabulary words can be the vocabulary words in every class and used all throughout the school in creative ways such as in history learning about different cultures independence day, in English learning about the definition of these two words and writing a story about when they have either been independent of dependent in their life, etc. These words can be used in every subject area but for now we will focus on math. First, have the students define these two words and then you can describe how the x is independent and the y is dependent. For this lesson the definition should just be introduced.

Next, an introduction to xy-tables by using different equations plugging in numbers to the x and getting the y. You can show this by drawing a crank, each student can even draw their own crank and show an equation, an x value, and the y value that you receive once you turn the crank and get your output.

To follow this is learning how to find slope. Instead of just telling them the formula try using a story. Attached is a story about Sam who climbs the sloped mountains of Algebraland, this story introduces negative, positive, zero and undefined slopes to the students. You may choose either illustrating the story yourself or have the students illustrate it as you read the story aloud.

Another way to learn slope can be to have them draw a life road map on an xy-axis. How this works is the student goes through their life starting at birth(the origin) and creating the positive and negative slopes with the different things that happened to them. For example, I got a new cat at age 6(x-axis) and they can choose how high to go on the y-axis but that would be a positive slope and then maybe later in life they would plot age 19 cat dies and depending on how negative of an experience that was they choose how far done it goes on the y-axis. This activity can really open students up about their life and really break the boundaries down in the classroom.



Using the vocabulary from the past couple days on graphing students can do the activity, Academic Lyrics. This activity you start with having students list off words that you have used in class and write them on the board. Then have the students pair up and tell a story to each other using those words as many times as they can in a minute while the other person keeps track of how many times the words were used correctly. And then this is repeated by having the partners switch roles. This activity is a good one to use to get the students saying the vocabulary they have heard throughout this lesson.

To practice graphing using slope intercept form you can give the students different cards with graphs on them and then take your students outside and have them graph the different equations. This is a very good way to assess the students and see how they are doing with graphing. I recommend an entire day just practicing graphing because it is a hard concept for students to grasp.

Closure at the end of the lesson can be having the students relate, in their notes or on a sheet of paper, solving multi-variable equations to slope intercept form and reflecting on the most helpful part of the lesson.

Lesson 4: Real-world applications (1-2 days)

At the end of this lesson students will be able to apply their knowledge of graphing slope intercept problems to real-world applications. Start this lesson by having a discussion about how math can relate to the real world. Have them think on their own or think with a partner and then come together as a class. Once you have seen what they have come up with explain how we usually use graphing lines to compare prices with respect to time. With this you can really use their different backgrounds and the surrounding community to collect data or to discuss different things that they have seen go up or down in value as time goes on. I have a few examples of activities but there are many possibilities with applying real-world applications to graphing.

The first activity is breaking the students into two or more groups and giving them different cell phone companies plans. Rivaling cell phone companies is a fun topic because students are interested in cell phones and technology and relating math to their

daily lives is always a bonus. In these handouts the students are asked to write an equation given the plans and then they are asked, “if I used 100 minutes how much would my bill be?” Once the students have completed many different amounts of minutes they will graph their data that they received on a big graph in the front of the room. Once all the plans are graphed students will analyze the data and see which plan is better when. Analyzing data is a very important skill but by breaking it down by comparing some real-world application makes it fun for the students to learn.

The second activity, line analysis with rockets, is another very hands-on activity. In this activity students will be given premade rockets (if you are daring you can have the students make their own) that they shoot at a target. Each student will shoot with their left, right, and then both hands together. They will get a certain number of points based on where the rocket lands. Once they have followed the handout and calculated bonus points they can plot their lines on the graph and figure out, which way to shoot the rocket was the best. This activity focuses on gathering their own data and analyzing it to make a conclusion.

Extending the lesson

Other activities that can be done are field trips into the local community such as car dealerships or supermarkets and talking to the managers to find data on certain cars or foods respectively, values over time. You can also go to different students communities and see the change in value over time of one certain food and analyze the best place to shop at. If field trips are not an option students can most likely find this information online or over the phone. Once the students have found

data they can present it to the class and the students can analyze all the data together by having a discussion and coming to a conclusion on their own what they feel is the best thing to do.

Having students follow stocks online and presenting their stock and data to the class is a fun real-world application. After each student presented their stock the students can vote on which stock they want to invest in as a class. This activity can be drawn out throughout the school year by following the stock and seeing if they made the right decision.

All of these lessons can be modified to the learner that the teachers have. For example, this lesson plan mends well to English Language Learners because Banks and Banks set out a list of a successful class, which I believe is covered in these lessons, "a high level of noise; students working in groups with hands-on materials; word walls, graphic organizers, displays of student work; teachers modeling strategies; assessment being used to drive instruction; and high expectations for all students"(Banks 2010). With the constant activities and different uses of assessment many of the areas above are covered. As well as defining a lot of vocabulary and using the vocabulary defined throughout all the lessons. The form of teaching that should be used in every classroom is "Say, See, Do," which starts by the teacher explaining something and then demonstrating it and then the students doing it (Jones, 2007). "Say, See, Do" is a continuous cycle throughout a lesson that can give the ELLs the chance to see the teacher model the information as well as using hands-on learning to do it themselves or with a group. Lastly, at this school

high expectations for all students is part of the mission and is a fundamental basis of the school.

Like ELLs, gifted students need a modified curriculum so they can succeed. Banks and Banks lay out that success for gifted students start with developing, "a talent-development philosophy, changes in standardized tests and assessment practices, culturally sensitive tests, multicultural assessment preparation for professionals, and the effective development of policies and procedures"(Banks 2010). Most of these requirements for the success of gifted students are in the schools philosophy, but teachers must implement and help further educate and modify their curriculum to fit gifted students. For example, give the gifted students leadership roles in the classroom or additional independent projects. Also by giving all students many different opportunities for extra credit or optional working beyond just the homework or lesson for that day is one way that gifted students can use their skills to be at the level they should be learning at.

For both ELLs and gifted students having a wide range of people to help and support these students is much necessary especially while trying to create a multicultural environment (Banks, 2010). Resources that would be helpful for ELLs would be to have teachers, tutors, and community members that are multilingual to help the students understand material in their native language while still being able to communicate in English. Also, having a classroom where there is additional staff at all times so that gifted students could come to get additional reading, brainteasers, or academically challenging games. We want our students to feel

challenged and know that they can learn even when they are not in their scheduled classrooms.

Through multicultural education and the method of “Say, See, Do” teaching students can grasp the knowledge they need to empower themselves and think critically by drawing on their own experiences and applying them to mathematics. Through the example lesson plan I show how I can implement hands-on learning and public speaking skills into the curriculum to give students the skills they need to achieve higher education. Also many of the activities can work across subject areas by manipulating the topics, which is good for students to understand all sides of a topic by approaching it from many different ways. At this school students learn to use their voice through multicultural education methods by taking their experiences outside of school and applying it to their academics to achieve greatness.

Bibliography

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