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TE 846
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Final Project Alternative

Part I: Unit of Study

I am a junior/senior high mathematics teacher in a very small community, Hillman,

Michigan. I teach Algebra 1 to 8th graders, Algebra 2, Algebra 2A and 2B, and Advanced Math

(which rotates as Pre-Calculus and Trigonometry/Statistics every other year). In the

mathematics classroom, students encounter reading and writing struggles when faced with

new vocabulary, notes, directions, and story problems, just to name a few areas. I will be

focusing on a unit of study in my Algebra 2A course. Algebra 2A and 2B cover the same

material as Algebra 2, but it is spread out in two years. The students in Algebra 2A struggle

with mathematics and many of them struggle with reading and writing as well. Having Algebra

2 spread out over two years allows more students to be able to take on the challenges of

mathematics and succeed. Since students with learning disabilities are "expected to achieve

the same rigorous standards and participate in the same challenging curriculum as all other

students" (McGill-Frazen, 2000, p. 12) it is important that we allow for the support and extra

guidance that they would need for success in their mathematics curriculum.

The unit of study in my Algebra 2A course that I will be focusing on is a four week course

on basic probability and statistics. Throughout this unit students encounter lecture notes, new

vocabulary, new formulas, hands-on activities and word problems. These all require proficient

reading abilities to succeed. There are quite a few new vocabulary terms that students need to

learn in this unit of study. Students not only need to be able to know the process involved with

that term, but when to use it as well. I will seldom require that a student memorize difficult

formulas. I give the students reference sheets with all of the difficult formulas that they will

need for the entire year, in no particular order. Students need to be able to find the correct

formula to use in a situation and how to use it. I think that this helps to prepare a student for

the "real-world" in which they will have a world of information at their fingertips, but they need

to know when and how to use it.

Typically I use more teacher-led instructional methods in my classes, but have been

beginning to incorporate more hands-on and inquiry-based learning activities into each class.

This unit on Probability and Statistics is one unit that I have included some hands-on activities.

Klinger & Vaughn (1999) found that students "clearly preferred classrooms where they were

actively involved in lessons" (p. 32). Klinger & Vaughn (1999) also found that middle school and

high school students viewed hands-on experiments as "highly effective for promoting learning"

(p. 32). These studies were conducted with Learning Disabled and non-Learning Disabled

students.

To check for student understanding, I look at a variety of assessments. I collect student

notebooks on a weekly basis in which students keep their openers, notes, assignments and

quizzes in. I focus on student assignments to look for the level of student understanding. I also

periodically collect daily assignments or activities to get an immediate feedback on their

understanding. During the probability and statistics unit, I gave the students three short weekly

quizzes and a unit end project. Each quiz is focused on a different aspect within the unit. The

first quiz covers probability techniques and strategies we use to solve probability problems. These questions mainly comprise of word problems. This could be a challenge for students who struggle with reading in mathematics. The second and third quizzes comprise of different scenarios in which the students need to take the given information and choose the best type of graph to display that information; they also have to answer questions regarding a given graph.

Finally, as a cumulative assessment of everything the students learned in this unit regarding statistics, they need to complete an end unit project. In this project students need to decide upon a research topic in which they will be able to create a survey, graphs from their results of the survey, and gather data in relation to the topic on the internet to create a graph. Students compile all of their data, statistical measurements, and charts onto a poster board in which they present to the entire class. Next year, I would like to incorporate a writing aspect to this project. In the writing assignment, students will have to explain their research topic, the questions they used for their survey, and their results. In addition to writing about their survey and graphing part of the project, I would also like them to include research on their topic about other statistics on that topic. What have other data sources been able to find regarding their topic? Does it coincide with your survey results?

Part II: Reading and Writing Challenges

Students will utilize many different Language Arts skills within this unit. Students will be given notes in which they will need to not only copy, but also understand and comprehend. Within these notes students will encounter new vocabulary terms. Students will need to know the definitions of these terms and any processes or formulas that go along with these terms.

For example, in the first week students will encounter new probability vocabulary. One such term that they will need to know is 'combinations'. Students need to know that 'combinations' is an arrangement of terms when order does not matter. They will need to use their prior knowledge that 'combinations' is similar to 'permutations', but has one distinct difference-order does matter in 'permutations'. Along with this definition comes a formula that students need to use to find the number 'combinations' in a set. Students also need to know, when given a situation, which method to use: 'permutations' or 'combinations'.

In addition to note taking and vocabulary terms, students will also need to be able to use their Language Arts skills to read directions, decipher word problems and write out justifications for certain decisions made. It is very important that students be able to follow directions during a hands-on activity or in an assignment. Students will need to be able to follow directions on a worksheet or book assignment independently as these assignments are generally given as homework. Students can also use their textbook to get additional guidance and examples on how to do an assignment. Reading from the textbook for additional help would be an independent resource that the students can use if they are struggling when they work on their assignment independently.

In the end unit project, students will require use of their Language Arts skills in order to succeed. Students will need to decide upon a research topic in which they can create a survey, create questions for the survey relating to the topic, show the results of that survey through charts and graphs, research the topic on the internet to find data in which they will create a chart and describe that data using statistical measurements, and write a paper explaining all

aspects of their survey and research. Students will need to be able to create cohesiveness within all aspects of their project.

I will target two Language Arts challenges that my students will face in this unit. The first challenge that I will address is vocabulary. Students need to be able to understand the vocabulary in this unit (and any other unit in mathematics) in order to succeed. If students do not understand the processes behind these terms, they will struggle through probability and statistics. There is a large amount of vocabulary in this unit that the students will have to know and understand. Some of the processes can be similar, and students can really struggle with that. The second challenge that I will address is reading word problems. Students will encounter many word problems in this unit. Probability and statistics can be applied to real-world situations and it is important for students to encounter those situations. They will need to be able to pick out the important information, what question the problem is asking, and how to use that important information to answer the question.

Part III: Intervention Plan

    A. Vocabulary

I will use two different interventions to target the challenges students will face with vocabulary. The first intervention will be the use of decoding the vocabulary words.   The second intervention will be a similar strategy to the LINCS vocabulary strategy. I think that the use of both of these interventions will help students to succeed in understanding and properly using their vocabulary.

Students will need to be able to break apart new words in order to gain understanding. "Good readers will learn to parse longer words into segments… and relate familiar word parts to meaning" (Moats, 1998, p. 5). As a class we will spend time going over how to break apart words to gain understanding. We will also go over how to use the meaningful parts of those words (usually with Latin or Greek origin) to piece together the understanding of the new vocabulary. Moats (1998) stated that "the meaningful parts (morphemes) of these words are often recombined with others in compounds and affixed forms… many words can be deciphered from a few familiar parts" (p. 5). Take for example the term 'bivariate data' that my students will need to understand in this unit. 'Bi' is of Latin origin and means 'two.' When students reach the Algebra 2A course, they have encountered this prefix many times before in their math career. While 'variate' will be new, I teach them how to use resources such as the dictionary or the glossary in their textbook to learn its meaning. It means random variable in statistics. I will help them make a connection between the two words 'variate' and 'variable'. I would create a routine using this strategy every time that a new vocabulary term is encountered in this unit. Routinely using this strategy will hopefully create a habit for the students whenever they encounter new terminology.

I will also teach the students how to use a version of the LINCS vocabulary strategy when they encounter new terminology as well. The LINCS strategy uses tactics "to transform information or elaborate on it in various ways" that have been found to be "considerably more effective and efficient" than memorizing (Ellis, 1992, p. 1). The steps of the LINCS strategy are "L-list the parts; I-identify a reminding word; N-note a LINCing story; C-create a LINCing picture; S-self-test" (Ellis, 1992, p. 1). I will change these steps slightly to accommodate for a

mathematics classroom. Instead of "note a LINCing story" students will need to "note the

LINCing process." This would be any formulas relating to the term, or how that term may relate

to another term and its process. Also, instead of "creating a LINCing picture" it will be "creating

a LINCing example." Then students will be able to relate an example to the word. An example

would look like:

Combinations	An arrangement of terms (items/objects/etc) when order does not matter	
Combo Meals	$$\frac{n!}{(n-r)!}$$ where n is the number of things to choose from and r is the number of items being chosen	Example: Mary wants to order 3 items off of the dollar menu at McDonald's. The dollar menu contains 10 items. How many arrangements are possible?

Students would not only have to know what 'combinations' means and the formula that goes

with it, they would also need to know WHEN to use it. This strategy will help the students see

all the important aspects of the term when they go to self-test, which is the last step. When

students are self-testing, they should try to get the definition from the word, and then the word

from the definition using the I, N, and C steps to work towards the word or definition (Ellis, 1992).

B. Word Problems

To help students better understand word problems, I will be teaching them a "three-read" strategy described by Paula Miller and Dagmar Koesling. In the first read, students "read for understanding" asking questions as they read such as "What vocabulary do I not know? What's the real-world context of the problem? What's the situational setting of the problem (not the mathematical skills)? What questions are being asked?" (Miller & Koesling, p. 68). The second read students "identify a problem solving strategy" in which they ask

> What is the pertinent information in this problem? What problem-solving strategies could I use? Which of those problem-solving strategies is best suited for this problem? How will I represent the problem in the symbolic language of mathematics? What mathematical details will I select as I reason and solve this problem? (Miller & Koesling, p. 68).

In the final, third read, students read to "solve the problem and check for reasonableness" where they need to ask while reading: "Now that I understand the problem's content, how can I best use my math skills to solve the problem? How can looping back to the original setting help me interpret the solution?" (Miller & Koesling, p. 68).

It is important for the teacher to use informal assessments "throughout the three reads in order to understand student progress" (Miller & Koesling, p. 76). Informal assessments can

take many different forms. A teacher can ask questions of the students throughout the reading and discussions, calling on random students. Another possible informal assessment includes "thumbs-up" in which students can quickly tell a teacher if they understand a concept. Students put their thumbs in certain directions to state understanding: Thumbs up: "I understand the concept." Thumbs sideways: "I sort of get it." Thumbs down: "I need you to teach a bit more."(Miller & Koesling, p. 78). Additional assessments could include exit slips, and journal writing. I will use all of these strategies in order to gain an immediate feedback from the students regarding their understanding. This will allow for me to modify intervention strategies when needed to ensure the students are overcoming their reading challenges.

C. Pre- and Post- Assessments

To be able to track student improvement (or non-improvement) through using the intervention strategies I will give the students a pre-assessment at the beginning of the unit and a quiz, as I had discussed earlier, at the end of each week throughout the unit. I will also collect student assignments and homework collected in their notebook on a weekly basis. The end of the unit project, as mentioned earlier, will serve as a cumulative end of the unit post-assessment.

D. Classroom Routine

These strategies will be given to all of the students in the classroom. Students will not be singled out as those that need the intervention and those that don't. Although the students will not be singled out to be the only ones that use the strategies, I will be able to use the pre-assessments and informal assessments throughout the unit to find students that need extra

attention and support throughout the intervention plan. This will allow for the occurrence of different struggling students at various points throughout the unit.

Bibliography

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