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DMET 530 - Instructional Design for Effective Learning

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Final Project

This semester my major assignments concentrated on geometry lessons based on fundamental concepts of geometry and angles formed by parallel lines cut by transversals. The content focuses on the introductory terminology of the course and leads which is required to make conjectures about angles formed by parallel lines. The application of the concepts is taught in high school geometry classes which students could take in 9th, 10th or 11th grade. Majority of students take geometry in-person but there are online programs available if that is the need of the student. Geometry is a math course that has many opportunities to have different modes of instruction depending on the teacher's comfort level because of the visual nature of the material. This allows for opportunities for constructions to be done by hand with tools or constructions done with technology along with great opportunities for group work for the students to use manipulatives to visualize the shapes.

Geometry can be extremely frustrating to students especially during the first semester due students need to “think outside the box.” There is no set process for solving a geometry problem, just many terms, theorems and postulates that can be applied. Students who are more creative finally find a math class they can excel in while students who like processes may struggle for the first time in a math class.

Major Assignment #1: Learning Goals and Goal Analysis

Step 1: Instructional Goals

- By the end of the lesson students will develop skills related to the fundamental concepts of geometry.
- By the end of the lesson students will apply the properties of angles formed by parallel lines and transversals.

Step 2 b and c: Domains of Learning Goals and the Explanation

- Goal 1 - Intellectual Skills

  The goal starts with developing the knowledge about the basic terms and concepts of geometry by exploring and analyzing points, lines and planes and applying those basic concepts to understanding other terms. Students will need to classify and identify the concepts in real world application and solve problems using the concepts of segments and angles which are formed by prior knowledge.

- Goal 2 - Intellectual Skills

  The goal requires rules to be applied about parallel lines when cut by transversals to the knowledge already gained about angles. Then the rules will be used to problem solve real world applications.

Step 3: Steps

- Goal 1 - Major Steps (d)
    1. Define vocabulary and draw a diagram labeled correctly with letters and symbols.
    2. Make connections between different terms on a graphic organizer.
    3. Use the rules and formulas to solve problems using concepts of segments and angles.

4. Use the rules of segments and angles using algebra.
5. Use the rules and concepts to solve real world problems.

- Goal 1 - Sequencing (e)

  The major steps will be sequenced.

- Goal 1 - Description of Sequencing (f)

  Understanding of all the basic terms of geometry is crucial to gaining knowledge of geometry and being able to visualize the terminology in diagrams along with labeling brings more meaning to the terminology. Graphic organizers help to make connections to apply the terminology and understanding of the rules. Then the rules can be applied to solving problems of different levels and then using problem solving in real world applications.

- Goal 2 - Major Steps (d)

  1. Define parallel lines and angles formed by parallel lines cut by transversals.
  2. Identify angles in diagrams of parallel lines.
  3. Write rules of angles formed by parallel lines.
  4. Solve problems using the rules of angles formed by parallel lines.
  5. Solve problems using algebra to find the measure of angles formed by parallel lines.
  6. Solve problems using real world applications with parallel lines.

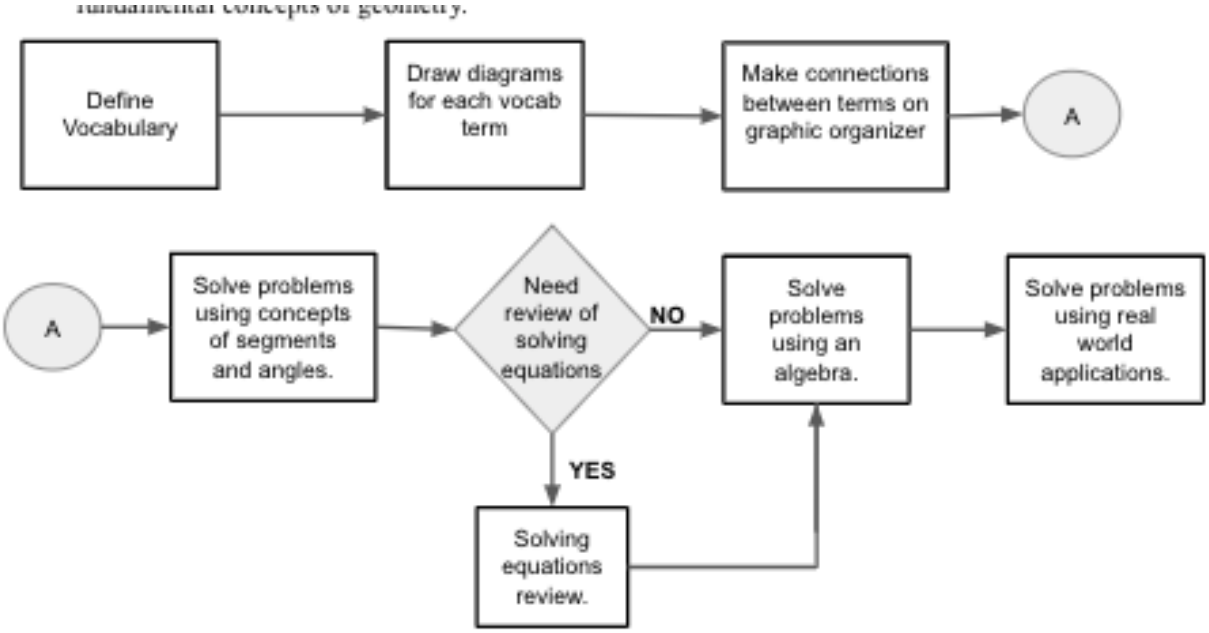
- Goal 2 - Sequencing (e)

  The major steps will be sequenced.

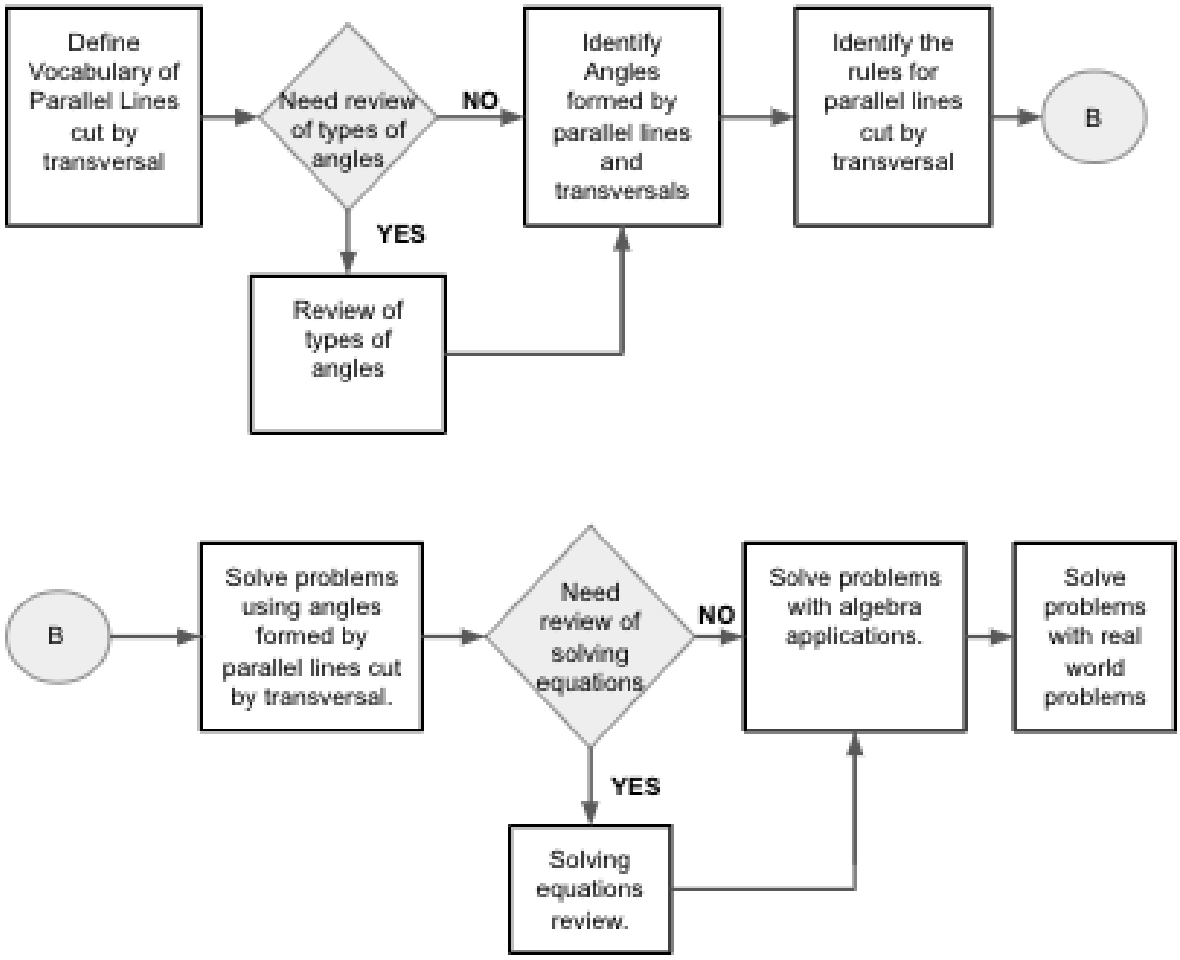
- Goal 2 - Description of Sequencing (f)

Sequencing is based on first understanding the concepts of parallel lines and how angles are formed when the parallel lines are cut by a transversal. Then making sure angles can be properly identified before solving the angles because rules are different depending on the type of angle. Once the angles can be identified then the rules can be applied to solve the different types of problems starting with basic problems then moving to algebra and finishing with real world applications.

Step 4: Diagram of Goal #1- To develop knowledge, understanding and skills related to the fundamental concepts of geometry.



Step 4: Diagram of Goal #1- Apply the properties of angles formed by parallel lines and transversals.



Major Assignment #2: Performance Objectives

Goal 1	Skill(s)	Performance objective(s)
By the end of this lesson, students will develop skills related to the fundamental concepts of geometry to solve problems with 70% accuracy or better.	Define Vocabulary including a diagram with labeling for each vocab term	None
	Make connections of vocabulary terms on graphic organizer	Given an online graphic organizer and access to a Chromebook, students will demonstrate the progression of the number of points that exist within each fundamental geometric figure by entering the vocabulary terms in the correct location based on the points and including a diagram showing the points that exist in each figure.
	Solving Equations Review.	None
	Solve problems using concepts of segments and angles.	Given puzzle worksheets with segment and angle problems, protractors and rulers, students will solve problems first using protractors and rulers to find measurements of angles and segments, then solve problems with and without algebra by using the concepts of segments and angles.
	Solve problems using real world applications	Given a worksheet with word problems about real world situations, students will read, analyze, and solve the problems by using the concepts of segments and angles.

Goal 2	Skill(s)	Performance objective(s)
By the end of this lesson, students will apply the properties of angles formed by parallel lines and transversals to solve problems with 70% accuracy or better.	Define Vocabulary including a diagram with labeling of Parallel Lines cut by transversal	None
	Review of types of angles	None
	Identify Angles and the rules of angles formed by parallel lines cut by transversals	Given a worksheet with details for city design project paper, rulers, and colored pencils or markers, students will create their own city by using the given criteria and the rules of angles formed by parallel lines cut by transversal to find locations for buildings in the city.
	Solving equations review.	None
	Solve problems using angles formed by parallel lines cut by transversal.	Given parallel lines cut by transversal online escape room activity, students will work in groups to solve problems and puzzles by using the concepts of angles formed by parallel lines cut by a transversal to find the codes to complete the escape room.
	Solve problems with real world problems	Given a worksheet with word problems about real world situations, students will read, analyze, and solve the problems by using the concepts of segments and angles.

Major Assignment #3

Performance Objective	Type of test item	Question
Given an online graphic organizer and access to a Chromebook, students will demonstrate the progression of the number of points that exist within each fundamental geometric figure by entering the vocabulary terms in the correct location based on the points and including a diagram showing the points that exist in each figure.	**Multiple Choice**	Which figure is defined by three noncollinear points? A. Line B. Segment C. Ray D. Plane
	Short Answer	Which figure has only one endpoint?
	Essay	Compare and contrast a line, ray and segment.
Given puzzle worksheets with segment and angle problems, protractors and rulers, students will solve problems first using protractors and rulers to find measurements of angles and segments, then solve problems with and without algebra by using the concepts of segments and angles.	**Short Answer**	Which formula helps find the length of a segment without using a ruler?
	Short Answer	If point X is located on line segment AB, what is the length of AB when AX = 10 and BX = 15?
	Short Answer	If point X is the midpoint line segment AB, what is the length of AB when AX = 2x + 4 and BX = 4x – 20?

Given a worksheet with word problems about real world situations, students will solve the problems by using the concepts of segments and angles.	**Multiple Choice**	What is the approximate angle measure formed and of the angle when a clock reads 5 o'clock? A. 90 degrees B. 30 degrees C. 120 degrees D. 175 degrees
	Short Answer	Where in your community do you find examples of angles and segments?
	Short Answer	Jose sees mile marker 237 when he enters the highway and mile marker 159 when he exits. How far did he travel?
Given a worksheet with details for city design project paper, rulers, and colored pencils or markers, students will create their own city by using the given criteria and the rules of angles formed by parallel lines cut by transversal to find locations for buildings in the city.	**Multiple Choice**	If an angle pair is located on the same side of the transversal and both interior angles, what type of angle pairs are they? A. Corresponding B. Alternate Interior C. Consecutive Interior D. Linear Pair
	Multiple Choice	In an angle pair is located on opposite sides of the transversal and both interior angles, what type of angle pair are they? A. Corresponding B. Alternate Interior C. Consecutive Interior D. Linear Pair

	Short Answer	Name the angle pairs that are on the same side of the transversal with one interior angle and one exterior angle.
Given parallel lines cut by transversal online escape room activity, students will work in groups to solve problems and puzzles by using the concepts of angles formed by parallel lines cut by a transversal to find the codes to complete the escape room.	**Short Answer**	Two lines and a transversal form how many alternate interior angles?
	Short Answer	If two angles are corresponding and formed by parallel lines, what conclusion can you make about their angle measures?
	Short Answer	If two angles are consecutive interior angles formed by intersecting lines what conjecture can you make about the angles?
Given a worksheet with word problems about real world situations, students will solve the problems by using the concepts of segments and angles	**Essay**	Explain how parallel lines are used in the real world.
	Short Answer	The letter Z illustrates alternate interior angles. Find at least two other letters that illustrate the pairs of angles and explain what type of angle pairs are represented by the letters.
	Short Answer	Give examples in your community where parallel planes can be found and explain the importance that they are parallel.

Major Assignment #4

I- Overview of the materials and the course:

Big Ideas Geometry – A Common Core Curriculum Textbook, by Ron Lawson and Laurie Boswell, 2015

The textbook has been used in our district for the last 4-5 years and it is a program that starts in middle school math and then moves to algebra 1 and geometry. Algebra II was also to be included but never purchased. The program includes a workbook for each student that includes guided notes, explorations, skill practice and extra practice for each section. The textbook is also available online with extra resources for both teachers and students. The online portion also allows students to complete problems that are in the textbook but online giving teachers options on which problems to select for students to complete and how many attempts students have to correct incorrect answers. When students work on the online assignments, they get instant feedback on whether an answer is correct and help is available for the students struggling with a question.

The program includes all common core standards that need to be covered in Geometry along with revisiting standards that would have been covered in earlier subjects.

II- Summative evaluation table:

No	Some	Yes	Criteria
	x		Congruency (instructional goals, organizational needs, and resources)?
		x	Content analysis (complete, accurate, and current)?
		x	Design analysis (instructional strategy and motivation)?
		x	Learners' achievement is notable when the materials are utilized
	x		Learners are motivated to learn and use the materials
	x		Skills are transferrable to performance context
		x	The materials are easy to use with current instructional strategies
	x		The materials include assessment and I don't have to develop one from scratch

III- Conclusion:

I have used this textbook program for several years and was a member of the committee to purchase the program and now I am currently a member of a cohort to revise our entire district's curriculum. I still would recommend this textbook as a resource but not a stand-alone curriculum. Today's education seems to be moving away from a curriculum design that is based on one resource but to move towards a curriculum that is based on essential questions and focusing on student understanding. It seems one resource cannot meet the needs of all students' understanding but a mixture of teacher knowledge, technology and resources.

Big Ideas program has many benefits for teachers to differentiate their lessons especially with the availability of the online problems. There are problems available from three different levels; basic, average and advanced. Teachers can select a mix of problems for an entire class, portion of a class or individually by student so the opportunity is available for teachers to create an individualized assignment based on a students' needs. This directly affects the learner's achievement and the learner's motivation; students need to feel like they can be successful when learning.

The program does supply many parts of an instructional plan by with skills checks at the beginning of a lesson to assess if students need a review of prerequisite skills, investigation activities to motivate learners about a lesson, guided notes to support IEP student or low functioning students, and lessons that are easy to follow in the text. For remediation there are extra resources available to the teacher for students who are still struggling and enrichment activities along with alternative assessment for more advanced students. Lastly, to address transferability, the program does include many real-world applications and the alternative assessments are real world applications so students can see how learning the lesson can apply to their future.

The assessments are appropriate for the advanced students but not differentiated enough for the other students and the question type is sometimes confusing to students on how to answer the questions. I will use some of the questions or rewrite them in a different format to better assess the students' understanding.

The main issue with the program is the amount of content to cover and the pace which is recommended by the authors to cover the material so that all topics are covered. Therefore, I use this program as a resource, where I pick and choose what needs to be covered for my students or I would never finish the course within the year.