Critical Assignment 1 - Designing A Technology-Rich Lesson

Teacher: Ms. Katelyn Milner	**Subject:** Algebra	**Grade Level:** 10th
Lesson Topic: Polynomials	**Time Required:** 3 weeks	

Sunshine State Standard / Big Idea: Standard 4: Polynomials.
 Perform operations on polynomials. Find factors of polynomials, learning special techniques for factoring quadratics. Understand the relationships among the solutions of polynomial equations, the zeros of a polynomial function, the x-intercepts of a graph, and the factors of a polynomial.

Benchmarks:
MA.912.A.4.1-Simplify monomials and monomial expressions using the laws of integral exponents.

MA.912.A.4.2-Add, subtract, and multiply polynomials.

MA.912.A.4.3-Factor polynomial expressions.

Access Points :
Cognitive levels for the benchmarks above:
MA.912.A.4.1-Low

MA.912.A.4.2-Low

MA.912.A.4.3-Moderate

Independent:
MA.912.A.4.In.a- Simplify expressions with one unknown (variable) by identifying like terms.

MA.912.A.4.In.b- Solve equations with one unknown (variable) involving addition, subtraction, and multiplication. (Students may use a calculator).

MA.912.A.4.In.c- Combine like and unlike terms in number sentences representing real-world situations.

MA.912.A.4.In.d- Identify factors of expressions with whole numbers by dividing.

Supportive:
MA.912.A.4.Su.a- Solve number sentences (equations) with one unknown involving addition and subtraction facts using physical and visual models.

MA.912.A.4.Su.b- Identify like and unlike terms in number sentences representing real-world situations.

MA.912.A.4.Su.c- Identify factors of whole numbers by using division facts.

Participant:
MA.912.A.4.Pa.a- Identify a missing item from two or more sets.

MA.912.A.4.Pa.b- Recognize that joining sets of objects results in a larger quantity and separating sets of objects results in a smaller quantity.

MA.912.A.4.Pa.c- Separate groups of objects to 10 into sets with the same quantity.

Instructional Analysis - Prior Knowledge

Declarative Knowledge - Students should already know that…

1. The student should recognize polynomials.

2. The student should understand what a polynomial is.

3. The student should be able to explain how to solve linear equations.

Students should already know how to…

1. The student should know how to add, subtract, multiply, and divide exponents, monomials, and binomials.

2. The student should be able to solve linear equations for a one variable solution.

3. The student should know how to solve exponential functions.

Prior Knowledge Assessment Plan

The students will take a self-help evaluation quiz, that will help the teacher understand how much review is needed before the lesson is started.

Instructional Analysis – Declarative Knowledge

In this lesson, students will learn that….

1. The student will learn the difference between a monomial, binomial, and a polynomial. They will be able to identify and classify each.

2. The students will be able to classify the following terms: constant, linear, quadratic, cubic,

quartic, quantic, and polynomial of degree #.

3. The students will be able to classify the order of the polynomial.

Instructional Analysis – Procedural Knowledge

In this lesson, students will learn how to….

1. The students will learn how to add subtract, multiply, and divide polynomial expressions.

2. The student will be able to simplify polynomials.

3. The student will be able to factor polynomials.

4. The student will be able to foil the polynomials.

Interdisciplinary connections:

The students will be able to incorporate polynomial graphs in everyday activities.

Common Misunderstandings or Misconceptions:

A common misunderstanding about math is that students feel that they cannot relate to the work, and that they cannot accomplish what needs to be done. Students tend to not like math because it is harder than a lot of subjects, and therefore they will need to put more effort into this subject.

Plan to address these:

The teacher will address the fear of math by adding games to the lesson. Helping students see the fun in the lecture can help them forget their fear of the subject and enjoy the learning process.

Learning Objectives: *(List one in each category. **Remember, each objective must have a behavior, condition, and criterion**)*

Knowledge –

Students will be able to define and identify a polynomial expression. They will be able to solve the polynomials as well as interpret the graph of polynomials.

Comprehension –

 Students will be able to distinguish between monomials, binomials, and other forms of polynomials. They will understand the concept of multiplying, dividing, adding and subtracting polynomial functions and also the art of factoring and simplifying polynomials.

Application –

The students will apply their prior knowledge of basic algebra to simplify like terms. They will be able to work problems and explain their solutions to their classmates as well as family members.

Analysis –

The students will analyze different graphs and they will be able to explain what degree the polynomial has based on the graph alone.

Synthesis -

The students will be able to compose clusters of polynomial equations, and then they will be able to simplify their equations and explain them to the class.

Evaluation -

The students will take solve problems to test their knowledge of the subject and will be graded on the knowledge of understanding.

Learner Analysis:

1. Age Range & Gender – Age range is between 15-17 years old, female and male.
2. Race – White, African American, Asian, and Hispanic.
3. Socio-economic background – Lower class, middle class, and upper class.
4. Learning Style Preferences – Kinesthetic, visual, and auditory learners.
5. Disabilities & Exceptionalities – All disabilities will be addressed and understood. Students that need extra time and attention will be offered it and they will be able to learn with some help from the teacher and the groups they are paired in.
6. Motivation – All students will be able to drop one test grade and two quiz grades. They will also be given extra work to make up for lost school days or bad test grades. Each student will be given the option to complete their work daily or submit all assignments each Friday night.
7. Cognitive Skills (concrete, abstract, etc.) – This section will be testing both low and moderate cognitive levels. The students will be given challenging assignments, but not unsolvable.

Assessment Plan

Formative:

1. Throughout the lesson the students will be given an ungraded pop-quiz that tests their understanding of the lesson.

2. Each day the students will be given time to reflect on the lesson and will then writing in their math blogs what they learned that day.

3. The students will be given a clipboard with space for them to write any questions they might

have concerning the material learned thus far.

4. The students will be given quizzes that will count toward their final grade in the class.

5. The students will be given homework to complete before the next lesson that will be graded and handed back to them with detailed explanations.

Summative:

1. The students will be tested on the lesson.

2. The students will present how to solve a polynomial function to the class.

3. The students will complete a test at the end of their webquest.

Instructional Strategies: How will you introduce the lesson?

The lesson will be introduced using a PowerPoint filled with definitions, examples, and self-test questions.

How will you teach concepts during the lesson?

The teacher will show examples and use the PowerPoint to explain the concepts of graphs and solving techniques that can be used to simplify functions.

How will you conclude the lesson?

The lesson will be concluded using a technology filled webquest that the students are required to complete; the webquest will introduce, explain, and help the students understand each concept of the lesson.

Classroom & Technology Management Strategies:
The teacher will closely monitor the students' computer use and will deduct points from their attendance score if the classroom rules and ethics have not been adhered to.

Learning Activities:

During the introduction of the lesson, students will:

The students will be expected to take a beginning self-knowledge ungraded test that will show the teacher where the class stands as a group. The students will be expected to take detailed notes and

raise their hands to participate in classroom discussions. They will be able to ask questions and even comment on their thoughts on the subject.

During the lesson, students will (Mention WebQuest):

The students will take detailed notes which will be stored in their folders for their own personal use. The students will also complete homework assignments and be expected to answer questions (and ask questions) during the lecture. They will take quizzes, work in groups to finish in class assignments, and write daily in their math blog. Finally the students will be expected to complete a webquest that will help them understand, in detail, the lesson.

At the conclusion of the lesson, students will:
Students will be able to solve polynomial expressions, as well as factor.

Materials & Resources:

Supplies:
 -Book
 - Paper
 -Pencils

Technology tools (Software and hardware):
 -Calculator (TI-83 or TI-84)
 - Computer for the webquest

URL's you will use:
-http://www.gradeamathhelp.com/polynomials.html
 - www.wolframalpha.com
 -www.purplemath.com

Self-Evaluation:
The lesson plan should be used successfully by all students. The lesson plan is meant to dive into the uses of polynomials and help students address the math anxiety better.

Teacher NETS addressed:
The teacher will address NETS by not letting any student see difficulty in the lesson. The teacher will strive to help every student to the best of her ability.

Student NETS addressed:

The students will address NETS by striving to do their best in the class.

Lesson Strengths:

The strengths of this lesson plan are the web quest and the power point. Both of these tools will help the student see real life examples as well as do research on their own.

Lesson Weaknesses:

The weakness of this lesson is that there are not many activities in which students must work together.

Possible Solutions or Action Plan for Improvement:
For future use the teacher will assign more tasks that students must learn together. More group activities.
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Critical Assignment 1 – Designing a Technology-Rich Lesson (100 points)
FEAP#10: Planning (10.2, 10.3, 10.6)
Critical Assignment 1 Rubric

	Demonstrated	Demonstrated w/ Remediation	Not Demonstrated	Not Applicable Not Observed

	Demonstrated	Demonstrated w/ Remediation	Not Demonstrated	Not Applicable Not Observed
Foundations				
1. Sunshine State Standards, Benchmarks, and Access Points for the lesson are included, along with cognitive levels.				
2. Lesson includes an explanation or description of at least one item, in the instructional analysis of prior knowledge in both declarative and procedural domains.				
3. Lesson includes an explanation or description of an appropriate plan which the teacher will use to check for students' prior knowledge.				
4. Lesson includes an explanation or description of at least one item each, in the instructional analysis of declarative and procedural domains, indicating what students will learn.				
5. Includes an explanation or description of specific interdisciplinary connections.				
6. Misunderstandings are predicted and plan to address them is specified.				
7. One specific, measurable learning objective is included for each level of Bloom's Taxonomy of the cognitive domain, and all 6 have an appropriate behavior, criterion, and condition.				
8. All 7 categories of learner analysis are addressed and adequately described.				
Assessment - How Students will Demonstrate Their Understanding				
9. Formative Assessment (throughout lesson) – The lesson includes a detailed plan to determine what students are				

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learning during the lesson.				
10. Summative Assessment (after lesson) – The lesson includes a detailed plan to determine what students have learned from the lesson.				
Learning Plan **Instructional Strategies, Learning Activities, & Technology**				
11. Instructional strategies include an explanation or description of what the teacher will do during the lesson, from introduction to conclusion. Teacher technology use is adequately articulated.				
12. Classroom and technology management strategies are clearly and adequately articulated.				
13. Learning activities include an explanation or description of what the students will do during the lesson, from introduction to conclusion. Student technology use is adequately articulated.				
14. Instructional resources for the lesson are clearly articulated, and there is a well-thought out list all the supplies and technology tools required throughout the lesson. At least 5-7 URLs (excluding the teacher's web pages) are also provided that will aid in the teaching and learning of the lesson.				
Self-Evaluation				
15. Self-evaluation is a thoughtful and reflective paragraph which includes details about how the lesson meets NETS standards for both teachers and students. *(Do not copy and paste the*				

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standards. Explain how the lesson meets them.)				
16. Lesson strengths and weaknesses are clearly and adequately articulated. *(Do not include project requirements. Those should already be there.)*				
17. Evaluation includes a professional development plan, with specific suggestions about how to improve the lesson. Specific sources for PD are included along with the sources. (You may need ideas from another professional.)				
Formatting & Presentation				
18. Required template was used, and new information is presented in regular font face. Formatting is flawless or has less than 3 minor issues.				
19. College level writing is used to articulate ideas, and lesson plan language maintains formal, professional tone.				
20. Lesson plan has fewer than 5 grammatical and/or spelling errors.				
Comments: Overall Rating				

Adapted from Wiggins, G., & McTighe, J. (2005). Understanding by design (expanded 2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

*Reminder: *Refer to Critical Assignment Policy; Students are considered "In Remediation" if they do not pass the Critical Assignment on the first attempt.* ***Students "In Remediation" who pass the Critical Assignment on the redo/2nd attempt will pass the course, <u>but the original points towards the final grade remains the same</u>.***