Interim Design Plan #3

Angela Trunzo

IT 570 Instructional Systems Design

November 18, 2013

Instructor: Dr. Miriam Larson

Executive Summary

The purpose of the unit of instruction that follows is to teach students how to solve real-life and mathematical problems involving area, surface area, and volume. The target audience for the instructional unit is primarily high school juniors who have an IEP (Individualized Education Program). By the end of the unit of instruction, students will be able to name polygons and solid 3D figures, and find perimeter, circumference, area, surface area, and volume of polygons and solids. The instructional content will be delivered in a blended environment with a mix of traditional face-to-face synchronous and asynchronous activities.

Introduction

In order to obtain a high school diploma in Tennessee, students must earn 22 credits in science, social studies, English, math, fine arts, P.E./health and wellness, foreign language, personal finance, and an elective focus area. Requirements for special education students are no different; however, in the area of math, students with disabilities may achieve credit through increased instructional time, appropriate methodologies, accommodations, and other differentiated instruction as determined by the IEP team (Fisher & Townsend, 2010). All high school students are required to take four credits of math. Most special education students take Algebra I their freshman and sophomore years and take Geometry their junior and senior years. This slower pace allows students to spend about four times the amount of usual time on math standards, and the additional time on task afforded by parts of the instruction that will be online is anticipated to better prepare these students to pass the course.

The Knox County Schools curriculum and instruction department has set forth the curriculum framework for Geometry teachers and students. The basis of the need for my

proposed unit of instruction is that the goal and objectives outlined below will be tested on the

county's end-of-course exam. Students' grade on the exam will be worth 25 percent of their final

grade, and they will need to pass the course with a D or higher in order to get the math credit

needed to graduate high school. In addition, the high school where the unit of instruction will be

implemented has recently become a 1:1 laptop school, where every student and teacher has their

own MacBook Pro. The school uses Canvas, a learning management system, to store and provide

access to course offerings.

<u>**Learner Analysis**</u>

The target audience for this instruction is special education high school juniors with

specific learning disabilities in reading comprehension, written expression, and math, and/or with

autism, functional delays, and emotional disabilities. In addition, special education high school

seniors who failed Geometry A and sophomores who struggled taking Algebra I may also be

included in the target audience. Because the course is offered at a slower pace, the target learners

are able to spend about four times the amount of time that regular education students spend on

the course. Also, the targeted students have an IEP, which includes accommodations in the

classroom and on the end-of-course exam. Common accommodations include extra time for

assignments and tests, small group setting, oral and written directions, use of calculator, and

abbreviated and modified assignments.

Academic motivation of the learners will need to be addressed. Most students have not

had much success with math. They struggle with fluency and conceptual understanding of topics.

Although the subject of instruction was presented in middle school math, many students'

background knowledge may be hazy as their long-term memory is often deficient. This means

the topic of instruction will be presented as new material. The slower pace of instruction will

allow for students to experience success of objective mastery, and, in turn, increase their

motivation to learn new material.

<u>Performance and Learning Contexts</u>

The performance context for this instruction is two-fold. Students will use the knowledge

and skills gained through this instruction on the end-of-course exam at the end of their senior

year of high school, and in real-life situations involving perimeter, area, surface area, and

volume. For example, students may have to one day determine how much paint to buy or if a

particular piece of furniture will fit in their home's living room.

The learning context will take place in a public high school classroom equipped with a

Smartboard, document camera, projector, and laptops for the instructor and each student. The

school follows a block schedule where classes are 80 minutes. The instructor will primarily take

an Instructivist approach but also incorporate Social Constructivist pedagogy. Learners will

engage in a variety of learning processes and activities based on Bloom's Taxonomy. Students

will work independently as well as collaborate with partners and in small groups synchronously

and asynchronously. Learning will be assessed formatively on a daily basis using bell work, exit

tickets, and quizzes.

The more there is alignment between the performance and learning contexts the better the

transfer of learning (Larson & Lockee, 2014, p. 63). While on a practical performance level

students will use their newfound knowledge in real-life, the more immediate performance

context will be the county end-of-course exam. This means there will have to be a balance of

providing authentic situations or tasks for the learner along with exam-type questions so that the

learner is prepared for both types of situations where they will ultimately use the knowledge and skills obtained from the instruction.

<u>Overall instructional goal</u>

Students will work in a blended learning environment to master the Common Core State Standard (7.G.B) of solving real-life and mathematical problems involving angle measure, area, surface area, and volume. In order to reach that goal, students will need to master a series of daily objectives. Students will be able to

- Name polygons

- Find perimeter, circumference, and area of polygons

- Identify solid figures in 3D

- Find surface area and volume of solids

(*Please note: The topic of angle measure will be addressed in a different module, and the addition of finding perimeter and circumference has been added by Knox County Schools curriculum and instruction department*.) Students will demonstrate mastery of these objectives by receiving instruction face-to-face and online, and completing synchronous and asynchronous activities.

Content Treatment

The theoretical basis for the instructional design will include assumptions about learning and different pedagogical approaches while explaining clear links to the learning outcomes those approaches will support. Assumptions will be mainly cognitivist but will include some constructivist elements. A crucial cognitivist assumption is the importance of linking old knowledge to new knowledge (Larson & Lockee, 2014, p. 77). Moreover, the constructivist

approach emphasizes "authentic real-world experiences and reflection about those experiences" (Larson & Lockee, 2014, p. 77). As for the pedagogical approach, the instruction will be primarily Instructivist in nature for the foundational skills required. There will also be room for a Constructivist approach where learners will be involved in activities that mimic real-world situations once those basic skills and knowledge have been mastered. In sum, I am taking this pedagogical approach and including these teaching and learning strategies to prepare learners to master these assessments to prepare them to become competent in solving real-life and mathematical problems involving angle measure, area, surface area, and volume. I believe learning takes place when information is organized from simple to complex and accompanied by practice and feedback from the instructor while at the same time acknowledging the importance of collaborative groups so that learners can experience different perspectives and build knowledge together (Larson & Lockee, 2014, p. 83-85).

The Knox County Schools Curriculum and Instruction Department determined the instructional content for the unit of instruction. All middle and high school mathematics courses follow a curriculum framework based on the Common Core State Standards (CCSS). High school Geometry contains five "modules" of instruction. The standard being covered in this design project is under the first module called "Preparing for Geometry." Topics in the first module include a foundational review of skills that have been taught in previous math courses, such as Algebra I and middle school math, and will be used in upcoming Geometry modules. Modules are sequenced in order but standards within Modules may be adjusted at the instructor's discretion. The standard being taught in this unit of instruction comes near the end of the first module with previous standards' skills serving as the foundation for the next. For example, at

this point in the curriculum, students know how to evaluate and solve algebraic expressions and

equations.

The action map in the Appendix provides a thorough content analysis that illustrates the

terminal goal, supporting objectives and knowledge, and relationships between those elements.

Aligned Outcomes, Assessments & Strategies

Terminal goal: *Students will be able to solve real-life and mathematical problems involving angle measure, area, surface area, and volume.*		
Learning Outcomes	**Assessments**	**Instructional Strategies**
Objective 1.0: Name polygons **1.1** Identify names of polygons **1.2** Match name to shape of polygons	**Formative:** Bell work, exit tickets, quizzes: provided a word bank, the student will be able to identify polygons. **Summative:** On a multiple-choice test with three answers to choose from, the student will be able to choose the name of the given polygon.	**Motivate learners to engage in learning processes:** Keller's ARCS motivation strategies (for example, to build learner confidence, realistic goals will be set, i.e., a handful of polygons to memorize at one time) **Present content and communicate expectations asynchronously:** Narrated PowerPoint presentations that provide a variety of examples **Organize content to aid mental processing:** Graphic organizer for notes, online flashcards, visuals – pictures and real-life examples **Scaffold and guide, provide practice and feedback, differentiate and transfer:** Chunked learning (not all polygons in one day), drill and practice module, guided and independent practice, prompt feedback on performance **Promote cooperation and collaboration synchronously in a face-to-face setting:** Teambuilding (matching activity game/competition)
Objective 2.0: Find perimeter, circumference, and area of polygons	**Formative:** Bell work, exit tickets, quizzes: using class notes and examples, the student will be able to calculate perimeter,	**Motivate learners to engage in learning processes:** Keller's ARCS motivation strategies (for example, to promote relevance,

2.1 Calculate perimeter of polygons **2.2** Calculate circumference of polygons **2.3** Calculate area of polygons	circumference, and area of polygons. **Summative:** On a test with a formula sheet, the student will be able to calculate perimeter, circumference, and area of polygons. **Knox County Schools Tasks:** Zoo Enclosure, Geometry House Plans	future usefulness of skill will be explored) **Present content and communicate expectations asynchronously:** Lecture via screencast, online tutorials, authentic problem scenarios, variety of examples, and peer tutoring (synchronously) **Organize content to aid mental processing:** Graphic organizer for notes, online flashcards, visuals – pictures and real-life examples **Scaffold and guide, provide practice and feedback, differentiate and transfer:** Chunked learning (not all topics/formulas in one day), drill and practice, guided and independent practice, prompt feedback on performance **Promote cooperation and collaboration synchronously in a face-to-face setting:** Group project, Think-Pair-Share, scavenger hunt
Objective 3.0: Identify solid 3D figures **3.1** Identify names of solid 3D figures **3.2** Match name to shape of solid 3D figure	**Formative:** Bell work, exit tickets, quizzes: provided a word bank, the student will be able to identify solid 3D figures. **Summative:** On a multiple-choice test with three answers to choose from, the student will be able to choose the name of the given solid 3D figure.	**Motivate learners to engage in learning processes:** Keller's ARCS motivation strategies (for example, to build learner confidence, realistic goals will be set, i.e., a handful of solid 3D figures to memorize at one time) **Present content and communicate expectations asynchronously:** Narrated PowerPoint presentations that provide a variety of examples **Organize content to aid mental processing:** Graphic organizer for notes, online flashcards, visuals – pictures and real-life examples **Scaffold and guide, provide practice and feedback, differentiate and transfer:** Chunked learning (not all solid 3D figures in one day), drill and practice, guided and

		independent practice, prompt feedback on performance **Promote cooperation and collaboration synchronously in a face-to-face setting:** Teambuilding (matching activity game/competition, walk-about activity)
Objective 4.0: Find surface area and volume of solids **4.1** Calculate surface area of solids **4.2** Calculate volume of solids	**Formative:** Bell work, exit tickets, quizzes: using class notes and examples, the student will be able to calculate surface area and volume of solids. **Summative:** On a test with a formula sheet, the student will be able to calculate surface area and volume of solids.	**Motivate learners to engage in learning processes:** Keller's ARCS motivation strategies (for example, to promote relevance, future usefulness of skill will be explored) **Present content and communicate expectations asynchronously:** Lecture via screencast, online tutorials, authentic problem scenarios, variety of examples, and peer tutoring **Organize content to aid mental processing:** Graphic organizer for notes, online flashcards, visuals – pictures and real-life examples **Scaffold and guide, provide practice and feedback, differentiate and transfer:** Chunked learning (not all topics/formulas in one day), drill and practice, guided and independent practice, prompt feedback on performance **Promote cooperation and collaboration synchronously in a face-to-face setting:** Group project, Think-Pair-Share, relay race

Instructional technologies

A variety of instructional technology will be used during the unit of instruction. The delivery of instruction will be blended with activities occurring synchronously and

asynchronously. The course documents will be stored in the Canvas Learning Management

System.

Instructional strategy	Technology selection
Motivate learners to engage in learning processes	Smartboard used to display examples of polygons YouTube video clip of real-life situation of someone using knowledge of area and perimeter (maybe from HGTV show)
Present content and communicate expectations	Narrated PowerPoint presentations provide variety of examples accessible through LMS Lecture via screencast (KhanAcademy.org) and online tutorials (ShowMe.com) accessible through LMS
Organize content to aid mental processing	Graphic organizer (Word document) for notes, visuals – pictures and real-life examples accessible through LMS Online flashcards (Quizlet.com) linked to from LMS
Scaffold and guide, provide practice and feedback, differentiate and transfer	Chunked learning - Lecture via screencast (KhanAcademy.org) and online tutorials (ShowMe.com) accessible through LMS Drill and practice module – Socrative.com quizzes and space races Guided and independent practice – online textbook at Pearsonsuccessnet.com Prompt feedback on performance – Canvas LMS multiple choice quizzes
Promote cooperation and collaboration	Group project – collaborate online synchronously and asynchronously via Canvas LMS collaboration tool and discussion board

Implementation and evaluation strategies

The implementation of the unit of instruction will be relatively straightforward.

Preparations for the face-to-face portions of the unit of instruction will include daily lesson plans

and reproduction of learner materials. For the online synchronous and asynchronous portions of

instruction, guidelines for interactions and discussions will be established. The Canvas LMS

navigation will be arranged in a user-friendly way with course features following the same

format as previous units of instruction. Any new LMS features introduced will be explained

thoroughly. The school's TPaCK (technological, pedagogical, and content knowledge) coach and

computer technician will be consulted regarding issues that arise related to hardware and

software following school-wide procedures, e.g., sending students for help during help desk

hours or submitting teacher technology issues through the online tracking system, SchoolDude.

The evaluation strategy for the unit of instruction will follow Kirkpatrick's Model: Level

I Learner Reaction, Level II Learning, Level III Behavior, and Level IV Results (Larson &

Lockee, 2014, p. 11). The results of the different levels of evaluation will be presented to various

stakeholders – student, teacher, parents, math department head, math instructional coach, special

education supervisor, grade-level principal, and principal.

Level I Learner Reaction	**Key question:** Did the learners enjoy the unit of instruction and find it relevant? **Formative**: Exit tickets **Summative**: End-of-semester course evaluations
Level II Learning	**Key question:** Did the learners learn what they were supposed to learn? **Formative**: Bell work, daily quizzes **Summative**: Unit test
Level III Behavior	**Key question:** How did unit of instruction affect long-term learner performance? **Formative**: Benchmark tests **Summative**: End-of-course exam
Level IV Results	**Key question:** Did the unit of instruction impact students' retention rate for post-secondary level math courses or real-world applications after high school? **Formative**: End-of-course exam **Summative**: Post-secondary math placement tests, ability to apply learning in real-life situations

References

Fisher, J.E., & Townsend B. (2010) *High School Graduation Requirements: Implementation of the New High School Policy For Students with Disabilities* [PowerPoint slides]. Retrieved from www.state.tn.us/education/speced/doc/3210gradrequirements.ppt

Larson, M.B., & Kockee, B.B. (2014) *Streamlined ID: A Practical Guide to Instructional Design*. New York: Routledge.

Appendix – Content Analysis

angela

Goal: Students will learn how to solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

angela

Objective 1.0: Name polygons

angela

Objective 2.0: Find perimeter, circumference, and area of polygons

angela

Objective 3.0: Identify solid 3D figures

angela

Objective 4.0: Find surface area and volume of solids

angela

1.1 Identify names of polygons
1.2 Match name to shape of polygons

angela

2.1 Calculate perimeter of polygons
2.2 Calculate circumference of polygons
2.3 Calculate area of polygons

angela

3.1 Identify names of solid 3D figures
3.2 Match name to shape of solid 3D figure

angela

4.1 Calculate surface area of solids
4.2 Calculate volume of solids

angela

Please note: Instruction will be blended. Presentation of content and communication of expectations will occur asynchronously; guided practice and collaborative work will occur synchronously in a face-to-face setting.