TASK 2: INSTRUCTION COMMENTARY

Respond to the prompts below (**no more than 6 single-spaced pages, including prompts**) by typing your responses within the brackets following each prompt. Do not delete or alter the prompts. Commentary pages exceeding the maximum will not be scored. You may insert **no more than 2 additional pages of supporting documentation** at the end of this file. These pages may include graphics, texts, or images that are not clearly visible in the video or a transcript for occasionally inaudible portions. These pages do not count toward your page total.

1. Which lesson or lessons are shown in the video clip(s)? Identify the lesson(s) by lesson plan number.

[Clip #1: Lesson One, Clip #2: Lesson Three]

2. Promoting a Positive Learning Environment

Refer to scenes in the video clip(s) where you provided a positive learning environment.

a. How did you demonstrate mutual respect for, rapport with, and responsiveness to students with varied needs and backgrounds, and challenge students to engage in learning?

[I demonstrate mutual respect for my students by actively listening, asking clarifying questions, and providing equal opportunities for them to share with the class. I actively listen to my students by repeating or paraphrasing their statements in my own words to ensure that I understand them correctly (Clip #1- 2:40, 4:14 & Clip #2- 00:18, 3:09). This gives my students, particularly my RFEP students, a chance to correct me if I understood them incorrectly. When my students make a statement, I ask clarifying questions such as *why, why not*, and *which part are you referring to* (Clip #1- 2:50, 5:02 & Clip #3- 1:05, 2:40). Clarifying questions give my students a chance to elaborate on their thoughts, and demonstrate that I am paying attention and valuing what they are saying. I use equity (popsicle) sticks to select students to share with the whole class (Clip #2- 2:30). This ensures that every student has an equal opportunity to share their thoughts with the class and demonstrates that I value all their opinions.
I build rapport with my students, particularly those struggling with basic mathematical skills, by frequently checking in with them and providing positive and encouraging feedback. Individual check-ins allow students to provide me feedback on how well they are understanding the lesson and/or explain why they are confused (Clip #1- 4:05, 2:40). I provide positive feedback (*nice, awesome, good work*) after students successfully complete a task (Clip #1- 1:40, 2:39 & Clip #2- 3:10). I have noticed that encouraging feedback bolters my students' self confidence and encourages them to persist through difficult problems.
I challenge my students by asking them to explain and/or justify their problem-solving processes, as well providing problems where the solution method is not told in advance. For example, in Lesson Three when Heather is trying to determine if the ear is an obtuse triangle, I ask her why figuring out what type of triangle the ear is would establish congruence (Clip #2- 0:55). This question causes her to analyze her problem-solving method and whether or not it aligns with the solution she wants. In Lesson One, when Reginald incorrectly sets up an inequality, I ask him why he subtracted the two numbers (Clip #1- 5:01). This questions helps Reginald analyze the errors in his problem-solving method.]

3. Engaging Students in Learning

Refer to examples from the video clip(s) in your responses to the prompts.

a. Explain how your instruction engaged students in developing

- conceptual understanding,

- procedural fluency, **AND**
- mathematical reasoning and/or problem-solving skills.

[The Lesson Three *Puzzlement Problem* helps develop my students' conceptual understanding of Triangle Congruence Theorems. Students evaluate a problem before and after the lesson in order to better understand how the theorems are related to the properties of triangles. Before the lesson, students discuss whether the problem gives them enough information to determine whether the two ears were identical based on their prior academic knowledge (Clip #2- 1:30, 3:07). During the lesson, my students experimentally verify that non-congruent triangles can be created with two congruent sides and a non-included angle (SSA). At the end of the lesson, students revisit the *Puzzlement Problem* and use the new information they learned to re-determine if the two ears must be identical.

The *Independent Practice* section of Lesson One allows students to develop their procedural fluency in creating and solving equations. I guide my students in creating inequalities that compare the side of one triangle with the sum of the other two sides (Clip #1- 00:45). I allow my students to attempt to create the inequalities on their own before I give them exact directions (Clip #1- 4:40). When I am guiding my students in setting up equations, I ask them what the next step is instead of telling them right away (Clip #1- 1:27). Having my students attempt to create equations and think of the next steps to a problem on their own helps connect their conceptual understanding to procedural fluency.

To develop mathematical reasoning, I have my students explain their solution processes, write their work so that it is comprehensible, and engage in peer discussion. In Lesson One, Juan writes "15 < 21" and I ask him how he got 21 (Clip #1- 00:50). In turn, he explains how he added the values of the two sides of the triangle, 9 and 12. I encourage him to write "9 + 12" before 21 so that he can easily see where the 21 came from. Peer discussions help students analyze problems from different perspectives. In Lesson Three, Emely initially believes that the ears from the Puzzlement Problem must be identical. However, after discussing the problem with Levi, she begins to rethink her conclusion (00:16).]

b. Describe how your instruction linked students' prior academic learning and personal, cultural, and/or community assets with new learning.

[In Lesson Two, I activate my students' prior academic learning by reviewing the types of triangles using a graphic organizer. I build connections to their personal and community assets by asking them to identify examples of triangles that they see outside of the classroom. For example, Joseph identifies a Dorito as an acute triangle and a yield sign as an equilateral triangle. The *Exploration* activities in Lessons One and Two build upon my students' prior academic knowledge by having them construct triangles using rulers and protractors. They learned how to use the tools in their previous semester of Geometry.

Since my field school is an Arts and Entertainment Pathway school focused on acting, theater, and design, I base my *Puzzlement Problem* off of a scenario where two set designers create an Easter bunny. I use two students' names in this problem to illustrate how the scenario could easily apply to them. This is why I ask Emely and Levi if "you guys" made identical ears, rather than "they" (Clip #2; 00:10). This creates cultural and community connections with new learning.]

4. Deepening Student Learning during Instruction

Refer to examples from the video clip(s) in your explanations.

a. Explain how you **elicited and built on student responses** to promote thinking and develop conceptual understanding, procedural fluency, **AND** mathematical reasoning and/or problem-solving skills.

[I ask questions that promote students' thinking and extend their zone of proximal development regardless of their current understanding of the material. In Lesson One, Andrew tells me that he doesn't understand how to solve the problem (Clip #1- 2:40). I use his responses to help him develop his procedural fluency. First, I ask him to clarify which part of the problem doesn't make sense, to which he replies, "everything." To help him get started on the problem, I ask him to look at the student demonstrations on the whiteboard and if they make sense to him. When he is still confused, I verbally guide him through the steps that the student demonstrators used. I then help him apply this procedure by setting up a different problem that uses the same process.
To promote mathematical reasoning, I elicit student responses by holding partner discussions before a whole-class discussion during Lesson Three. This helps my students develop their answers and receive peer feedback before having to share out with the entire class. After discussing the *Puzzlement Problem*, I select three students to share their answers with the rest of the class. After each student responds, I build upon their responses by asking them to explain why their answer is correct. For example, Valeria tells me that we cannot be certain that the ears are identical, and after I ask her why, she responds by saying there is not enough information (Clip #2- 3:07).
My students engage in peer and whole class discussion to support their conceptual understanding of the Triangle Inequality Theorem in Lesson One. I have my students to discuss with the person sitting next to them whether it is possible to create two lines that connect two points (the school and Boba Time) that are shorter than one line (7th street) connecting the points. After each group decides that it is not possible, I ask them to explain the reason why. Afterwards, I ask for explanations from three randomly selected students. One student replies that it is not possible because the two lines will form a path that is less direct than the one line (Clip not shown)[1].]

b. Explain how you used representations to support students' understanding and use of mathematical concepts and procedures.

[In Lesson One, I use a representation of the students' community to demonstrate why the Triangle Inequality Theorem must be true. I connect two points, one labeled with the school's name and the other labeled "Boba Time" with a line segment labeled "7th street". I have my students discuss with each other why it is not possible to create two distinct lines that connect the school and Boba Time that are shorter than 7th street when added together. Some of students conclude that it is not possible because the shortest distance between two points is a single line (see Image #1), which is a concept used in Triangle Inequality Theorem. One student even adds that drawing the two lines connecting the school and Boba Time would create a triangle with 7th street.
In Lesson Two, I support my students' use of equations with squared numbers by presenting multiple representations: the exponent (a^2), the multiplication version (a x a), the calculator button (a ^ 2) and the English representation (a times a). I also provide numerical examples. These representations support my students' in using squared numbers, as well as address the misconception that "a squared equals a times two".
In Lesson Three, I help my students understand the concept of congruence by providing synonyms, real life and mathematical examples, and counterexamples. I ask my students for synonyms for "congruent", to which they reply "same" or "identical". I also ask them to name examples of congruent objects in the classroom, to which they name the desks, the textbooks,

[1] This clip is not shown because the name of the school is mentioned several times.

and the windows. I also ask them to identify objects in the classroom that are similar but not congruent, to which they name the ceiling panels and the three whiteboards. I illustrate pairs of both congruent and non-congruent geometric figures on the board, and remind my students that similar does not necessarily imply congruence.]

5. Analyzing Teaching

Refer to examples from the video clip(s) in your responses to the prompts.

a. What changes would you make to your instruction—for the whole class and/or for students who need greater support or challenge—to better support student learning of the central focus (e.g., missed opportunities)?

Consider the variety of learners in your class who may require different strategies/support (such as students with IEPs or 504 plans, English language learners, struggling readers, underperforming students or those with gaps in academic knowledge, and/or gifted students).

[In Lesson One, I fail to connect conceptual understanding with procedural fluency. Using the triangle that I drew that connected the school, Boba Time, and KBBQ, I write three inequalities: Path A < Path C + B, Path B < Path A + C, and Path C < Path A + B. I demonstrate how to use these inequalities to determine if three values can form a triangle, and how to determine the maximum and minimum values needed to form a triangle. Then, I pass out *Triangle Inequality Theorem Practice 1* and give my students time to independently complete it. However, more than half of my students did not even know how to start to solve the first problem, which was similar to the example I demonstrated on the board. I believe this happened for two reasons. First, I did not model enough examples. Second, I needed to provide scaffolding between modeling examples and having students work independently. This scaffolding could have been in the form of solving problems with Call and Response methods, group work, or a graphic organizer of the steps to solve the problems.

In Lesson Two, I guided my students in informally proving the Converse Pythagorean Theorem by creating either a right, acute, or obtuse triangle and squaring the sides. However, some of my students were not engaged in this activity, and sat at their desks doing nothing until I came and helped them individually. To change this, I need to make sure that all my students understand the instructions and promote accountability. To do this, I can call on students to paraphrase my instructions after I give them, and assign them partners to check each other's work for completion and correctness. Additionally, I decided in the middle of the activity to have students come up to the whiteboard and write their name next to the expression that fits their triangle ($a^2 + b^2 < c^2$, $a^2 + b^2 > c^2$, $a^2+b^2 = c^2$). If I had told them in the beginning of the activity that they were going to share their results with the rest of the class, my students likely would have been more motivated to engage in the activity .

The Lesson Three *Congruent Triangles Activity* was remarkably unsuccessful for many reasons. Firstly, I did not give my students enough time to complete this activity. I assigned half of the class to complete parts 1-3 of the activity, and the other half to complete parts 4-6. No group completed all three parts. A few groups did not even finish one part. Secondly, nearly all of my students found the directions very confusing. The groups that started with part 4 struggled to create a triangle with two angles and a non-included side. To do this, one had to draw a long line segment to connect the two pre-cut angles. Students had trouble doing this given their notebook's limited space. Most of the students didn't realize that they had to form the triangle in their notebook, rather than on their desk, or measure the lengths of the rectangles to determine which ones were the same. Thirdly, my students had difficulty understanding how the *Lesson Resources* were supposed to be used. In order to create identical lengths, I had my students cut out three congruent pairs of rectangles and trace the length of the rectangles into their

notebooks to create triangles. However, students were confused about which side was the length (the length was labeled, but only for rectangle A and D). Other students traced the entire outline of the rectangle, rather than just the length. A few groups tried to align the rectangles onto the visuals illustrated in the activity instructions, and then became confused why the sizes of the visuals and rectangles did not match. Finally, I forgot to review the definition of congruence before the activity, which was a key concept that my students needed to understand in order to complete the activity successfully.
If I conduct this lesson in the future, I plan to circumvent the difficulties presented by the materials by digitizing the *Congruent Triangles Activity*. Online resources such as mathwarehouse.com can generate triangles with given side lengths and automatically measure the angles (see Figure 2). Students can take screenshots of their triangles and present them on a Padlet or a Jamboard. The *Congruent Triangles Activity* was modified from a lesson plan by the Utah Education Network (uen.org). In the original activity, students were given straws to represent the lengths of the triangle rather than rectangles. I chose to use paper rectangles instead because I thought they would be easier to form triangles with. If I am unable to digitize this lesson, I might try straws, sticks, or algebra tiles. Additionally, I plan to complete at least one part of the activity as a whole class to ensure that the students understand the directions.
To better support student learning, I need to promote deeper class discussions. To do this, I need to encourage students to respond to each other's answers. For example, when discussing the *Puzzlement Problem* in Lesson Three, I walk around the room and ask each pair of students to share their thoughts. Usually just one student would answer me (Clip #2- 00:16, 00:30, 1:28). I missed the opportunity to have students engage in peer conversations by not asking the other student what they thought of the first student's statement. I could have done this during whole-class discussions as well, by asking my selected students for their thoughts about what the previous person said (Clip #2- 3:00). For example, I could ask questions such as "Do you agree with Emely's statement?" or "What would you like to add to Valeria's comment about…"
I noticed that throughout my lessons, my struggling learner did not engage in peer discussions. For example, when I instructed my students to discuss the *Puzzlement Problem* with the person next to them, she does not participate, likely because she is not sitting next to someone (Clip #2- 0:00 to 2:20). One change that I can implement is assigned seating or having students get up out of their seats to discuss the problem with someone not sitting close to them.
I created challenging problems in order to build my GATE learners' understanding of the lesson content. However, I noticed that very few students attempted these problems. I believe this happened for two reasons. First of all, I did not give them enough time to attempt the problems. Secondly, some problems were too challenging. For example, I presented problem 10 of *Classifying Triangles* to two college mathematics students, and neither were able to solve it. In order to encourage my students to attempt challenging problems, I need to create problems that are within their zone of proximal development, and give them enough time to solve them.
I noticed that some of my RFEP learners struggle with creating coherent sentences (Image #2) and comprehending less common verbs. For example, the Lesson Two Exit Ticket asked students to "explain how we can classify triangles using a^2, b^2, and c^2. One student asked me what "classify" meant, to which another student replied, "It means sorting and solving." As a result, that is what the first student wrote on her exit ticket (Image #3). I missed this opportunity to have the second student elaborate more on what she meant. To help support my bilingual learners, I need to implement more reading and vocabulary development strategies in my lesson, such as modeling, peer discussions, and graphic organizers.]

b. Why do you think these changes would improve student learning? Support your explanation with evidence of student learning **AND** principles from theory and/or research.

[Kilpatrick et al. (2001) highlights the importance of connecting conceptual understanding and procedural fluency. “Some algorithms are important as concepts in their own right, which again illustrates the link between conceptual understanding and procedural fluency. Students need to see that procedures can be developed that will solve entire classes of problems, not just individual problems” (p. 121). In Lesson One, by modeling multiple examples of how to determine whether three measurements can form a triangle, I can emphasize how this procedure is used to solve an entire category of problems. Ralabate (2016) explains how scaffolds are important in encouraging learner independence: “Scaffolds help you to create a learning environment that minimizes threats and distractions (Principle of Engagement), offers customized displays for information, provides options for comprehension (Principle of Representation), and enhances capacity for monitoring progress” (p. 113). Had I scaffolded the procedures for the *Triangle Inequality Theorem Practice 1*, it is likely that more students would have been able to solve these problems independently.

Lesson Two uses a cooperative learning strategy to build students’ understanding of the Converse Pythagorean Theorem. This activity is cooperative because each student was given a different part of the theorem to prove. According to Ralabate (2016), cooperative learning follows five major principles, two of which include “positive interdependence” and “individual and group accountability” (p. 93). These two principles were not emphasized during the activity. If I made it clear to my students that they would be held accountable for the work that they did, they would have been more likely to engage in the activity.

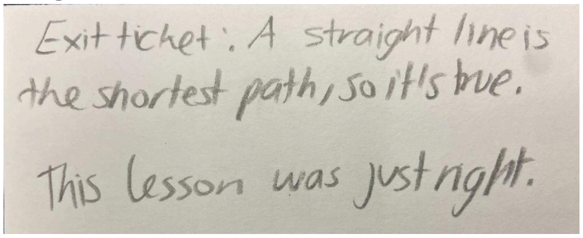
Evidence that the *Congruent Triangles Activity* was unsuccessful is that all students by one were unable to correctly answer the *Puzzlement Problem* by the end of the lesson (Images #4 & #5). The goal of this activity was for students to experimentally prove that SSS, ASA, SAS, and AAS establish congruence, while SSA and AAA do not. However, the complex instructions and difficult-to-use materials prevented my students from achieving this goal. This, combined with my not defining “congruence” before the activity, showcased how I failed to follow the most critical principle of UDL, which is to “define learning goals” and “concentrate on purpose, not activities” (Ralabate, 2016, p. 16). Presenting the lesson in a digitized format would be an alternative approach that might have allowed students to complete the activity more efficiently and better comprehend the learning goal.

Promoting peer discussion is important in developing students’ mathematical proficiency. A study by Moschokovish et al. (2018) found that “classroom discussions- in pairs, among small groups, and among a whole class- have been shown to support the development of both procedural fluency and conceptual understanding” (p. 1008). Figure #1 illustrates the connections between student to student interactions and mathematical instruction. It is critical that I promote deeper peer discussions and more student to student interactions in my future lessons. Evidence that supports my statement that some of my practice problems were too challenging comes from my informative assessment from the Lesson Three *Review*. In this part of the lesson, I present problem #15 from *Classifying Triangles* and give my students five minutes to try and solve it on their own. None of my students were able to find the solution to this problem, and relied heavily on my instructions when we solved it as a class.

Kenney et al. (2005) explains the importance of modeling to support mathematical reading comprehension. “Research has shown that mathematics text contains more concepts per sentence and paragraph than any other type of text...one strategy we arrived at is for teachers to model their thinking out loud as they read and figure out what a problem is asking them to do” (p. 10-11). I mentioned in the above prompt that I missed the opportunity to develop my students’ vocabulary by not asking the second student (the one who defined “classify”) to elaborate on her definition. Kenney et. al. (2005) would seem to agree that this was a missed opportunity, advising teachers to “encourage students to direct questions and explanations to the class, rather than the teacher…students listen harder when a peer speaks than when an adult does” (p. 76-77).]

Supporting Documentation

Image #1


Exit ticket: A straight line is the shortest path, so it's true.

This lesson was just right.

Image #2

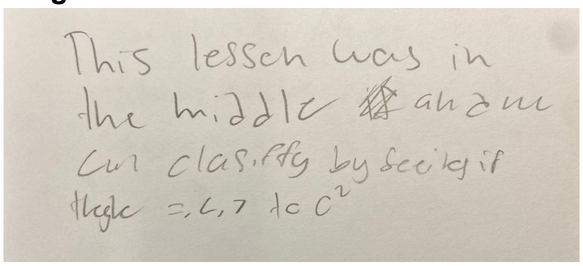
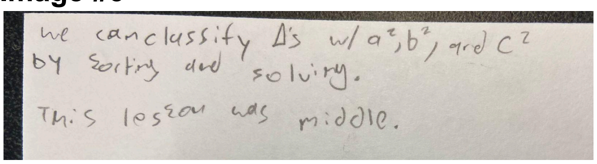
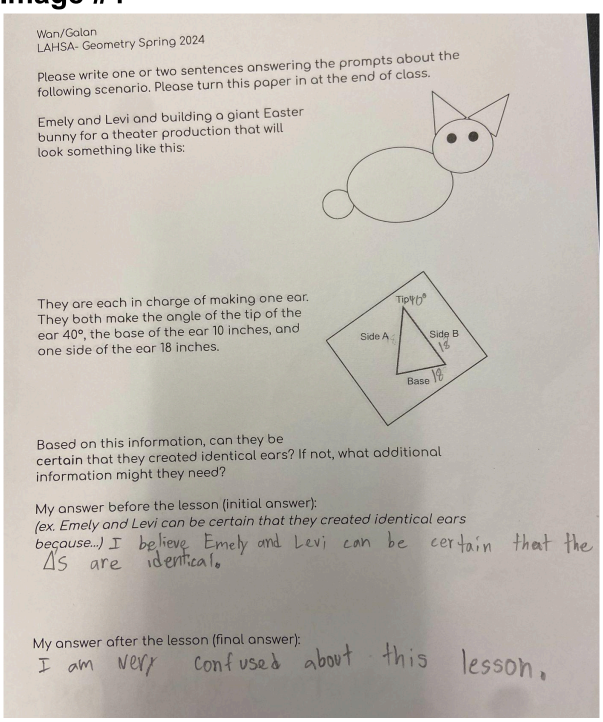

This lesson was in the middle and we can clasifty by seeing if they're =, <, > to c^2

Image #3


we can classify Δ's w/ a^2, b^2, and c^2 by sorting and solving.

This lesson was middle.

Image #4


Wan/Galan
LAHSA- Geometry Spring 2024

Please write one or two sentences answering the prompts about the following scenario. Please turn this paper in at the end of class.

Emely and Levi and building a giant Easter bunny for a theater production that will look something like this:

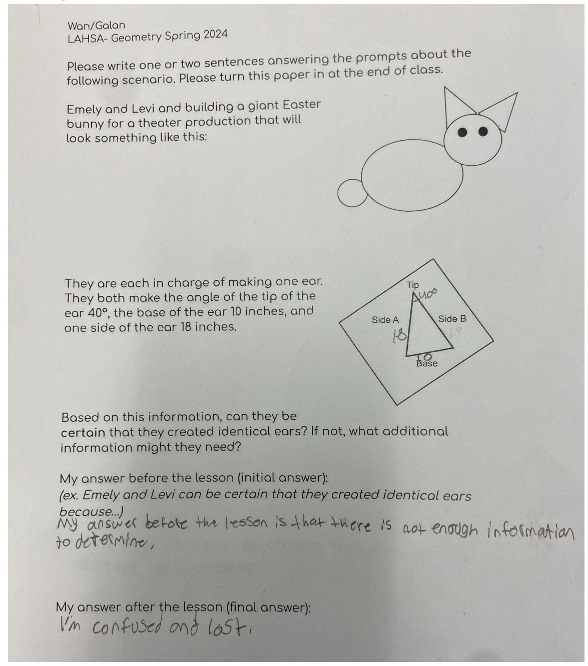
They are each in charge of making one ear. They both make the angle of the tip of the ear 40°, the base of the ear 10 inches, and one side of the ear 18 inches.

Based on this information, can they be certain that they created identical ears? If not, what additional information might they need?

My answer before the lesson (initial answer):
(ex. Emely and Levi can be certain that they created identical ears because...) I believe Emely and Levi can be certain that the Δs are identical.

My answer after the lesson (final answer):
I am very confused about this lesson.

Image #5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Based on this information, can they be certain that they created identical ears? If not, what additional information might they need?

My answer before the lesson (initial answer):
(ex. Emely and Levi can be certain that they created identical ears because...)
My answer before the lesson is that there is not enough information to determine.

My answer after the lesson (final answer):
I'm confused and lost.

References

Kenney, J. M., Euthecia Hancewicz, Heuer, L., Metsisto, D., Tuttle, C. L. (2005). *Literacy Strategies for Improving Mathematics Instruction*. Association for Supervision and Curriculum Development. Alexandria, VA. ISBN: 978-1-4166-0230-9

Kilpatrick, J., Swafford, J., & Findell, B. (2001). *Adding It Up, Helping Children Learn Mathematics*. National Academies Press. Washington, DC https://doi.org/10.17226/9822

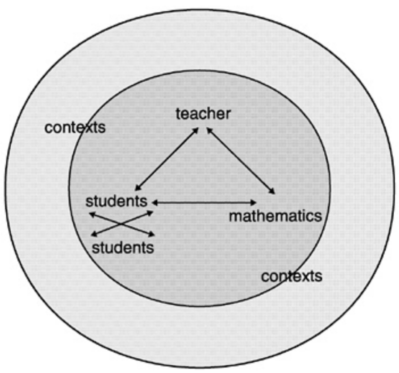
Moschkovich, J., & Zahner, W. (2018). Using the academic literacy in mathematics framework to uncover multiple aspects of activity during peer mathematical discussions. *ZDM – Mathematics Education, 50*(6), 999-1011. doi:https://doi.org/10.1007/s11858-018-0982-9

Ralabate, Patti. *Your UDL Lesson Planner : The Step-By-Step Guide for Teaching All Learners*. Maryland, Brookes Publishing, 2016. *ProQuest Ebook Central*, https://ebookcentral.proquest.com/lib/socal/detail.action?docID=4771958

Appendix

Figure 1

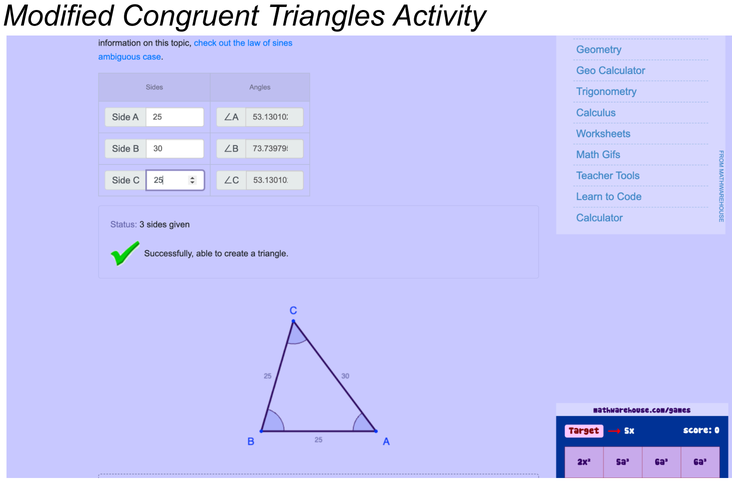
Box 9–1: The Instructional Triangle: instruction as the interaction Among Teachers, Students, and Mathematics, in Contexts



From: *Adding It Up: Helping Children Learn Mathematics, p. 314.* Washington, DC: The National Academies Press. Washington, DC https://doi.org/10.17226/9822

Figure 2

Modified Congruent Triangles Activity



From: *Online Triangle Calculator*. (n.d.). Math Warehouse. Retrieved February 2024, from https://www.mathwarehouse.com/triangle-calculator/online.php