

Chapter 3

Authentic Assessment in the Digital Age: A Brain-Based Framework with GenAI-Enabled Support – Dai Gu, Yueqing Zhong, and Bilgehan Ayik

Prompt:

“Hello! I am a mathematics teacher in the US and teaching 6th graders this year. I have a Turkish student in my classroom who just joined in my classroom, and I want to make sure he understood well calculating area and perimeter of 2D figures like rectangles, triangles, and squares. Can you prepare a high quality and detailed, authentic, culturally & linguistically responsive formative assessment so I can share with him?

Here are more details about my student that I learned from him and his family during our conversations. You don’t have to include all these details in the assessment design, but I want you to be mindful about these details:

Indigenous Language: Turkish

Supporting-dimension - Linguistic Layers (e.g., dialects, accents, regional language nuances): His English is WIDA Level-3. He speaks the Black Sea Dialect & Laz language at his home.

Race and Ethnicity: Turkish; Laz cultural heritage

Supporting-dimension – Regional Roots (e.g., subracial groups, regional identities, cultural heritage): He came from a city, Rize, in the Northern part of Türkiye.

Religious Beliefs: Muslim

Supporting-dimension – Faith Threads (e.g., branches of religion, spiritual practices): Sunni

Family and Community: He lives with his mother, father, and his little sister.

Supporting-dimension – Familial Foundations (e.g., family traditions, home values, support systems): He lived with his extended family in a small village before coming to the US.

Indigenous Knowledge: He has extensive knowledge on tea leaves' shapes and seasonal structures. He used to help his grandmother with picking tea leaves.

Supporting-dimension – Interests (e.g., prior learning, favorite subjects, hobbies): He is enthusiastic about geometry but struggling if any calculation is required. He has a cat.”

ChatGPT Response:

Here’s a **high-quality, detailed, authentic, culturally & linguistically responsive formative assessment** tailored for your Turkish student. It integrates his cultural background, interests, and linguistic proficiency (WIDA Level-3).

Formative Assessment: Tea Garden Geometry Exploration

Title: *Designing a Tea Garden for Your Grandmother*

Objective:

To assess the student's understanding of calculating the **area** and **perimeter** of 2D figures (rectangles, triangles, and squares) through a familiar and meaningful context.

Scenario:

Your grandmother in Rize is planning a new tea garden in your village. She needs your help to design different sections of the garden. Each section has a specific shape, and she wants to know how much space it will take (area) and how much fencing she will need around it (perimeter).

Use the information below to calculate the **area** and **perimeter** for each section.

Tasks:***Task 1: Rectangular Tea Drying Area***

Your grandmother plans a **rectangular area** for drying tea leaves. The length is **14 meters**, and the width is **6 meters**.

1. What is the **area** of this rectangular section?
2. What is the **perimeter** of this section?

Task 2: Triangular Sitting Area

The tea workers need a **triangular sitting area** where they can take breaks. The base of the triangle is **8 meters**, and its height is **5 meters**.

1. What is the **area** of this triangular section?
2. If all three sides of the triangle are **8 meters**, what is the **perimeter** of this section?

Task 3: Square Tea Storage Shed

The tea garden needs a **square storage shed** to keep tea tools and baskets. Each side of the square is **4 meters**.

1. What is the **area** of this square section?
2. What is the **perimeter** of this section?

Task 4: Create Your Own Design

1. Draw a **plan** of your grandmother's tea garden, including the rectangular, triangular, and square sections.
2. Add one extra section of your choice (rectangle, triangle, or square). Label its dimensions and calculate its **area** and **perimeter**.

Language and Cultural Support:

Glossary with Visuals:

Provide a vocabulary box with terms and definitions in **simple English** and **Turkish**:

- **Area (Alan):** How much space is inside a shape.
- **Perimeter (Çevre):** The total distance around a shape.
- **Rectangle (Dikdörtgen):** A shape with 4 sides, where opposite sides are the same length.
- **Triangle (Üçgen):** A shape with 3 sides.
- **Square (Kare):** A shape with 4 sides that are all the same length.

Include simple **diagrams** of each shape with labeled dimensions.

Sentence Starters:

Help the student construct their answers with provided sentence frames:

- "The area of the rectangle is _____ square meters because _____."
- "The perimeter of the triangle is _____ meters because _____."
- "I added a square section because _____."

Cultural Relevance and Connections:

1. **Relatable Context:** The tea garden reflects his prior experiences helping his grandmother, making the task meaningful.
2. **Creative Choice:** Allowing him to add an extra section lets him apply geometry in a personalized way.
3. **Familiar Measurements:** Use manageable numbers for calculations to build confidence.

Teacher Observation Goals:

1. Observe if he uses the correct formulas for area and perimeter.
2. Check for understanding of shape properties (e.g., identifying a square vs. a rectangle).
3. Encourage verbal explanations or drawings to support his reasoning.

This activity emphasizes connection, clarity, and confidence-building while integrating his cultural and linguistic identity. Let me know if you'd like further refinements! 😊