

Authenticity in 3D

Brittany Bowens, Lindsey Link, Dewey Hulsey, Teresa Lansford
Published by *K20 Center*

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Time Frame 55 minutes

Essential Question(s)

How can 3D printers be used authentically to support learning?

Summary

How can 3D printers be used authentically to support learning? In this session, participants will be able to distinguish between examples vs. non-examples of authentic 3D printing. Participants will view a LEARN lesson and maker challenge that applies authenticity using a 3D printer, extracting the points of authenticity within the lesson. Participants will have the chance to explore resources for creating 3D prints and connecting printing to the curriculum by exploring sites for downloading and creating their own products. Learn tips, tricks, pitfalls, and paths to successfully and authentically support learning through 3D printing. Bring your own device as you will get a chance to design prints of your own.

Learning Goals

- Distinguish between examples vs. non-examples of authentic 3D printing.
- Brainstorm and develop ways to integrate 3D printing into the curriculum.
- Build competencies in basic 3D modeling using Tinkercad.

Attachments

- Authentic Learning and Teaching Chart 2020 version—Authenticity in 3D.pdf
- Authenticity Framework Reading and Reflection Tool—Authenticity in 3D.pdf
- Follow the Green Not the Dream Lesson—Authenticity in 3D.pdf
- Jigsaw—Authenticity in 3D.docx
- Jigsaw—Authenticity in 3D.pdf
- Presentation Slides—Authenticity in 3D.pptx
- Tinkercad Scavenger Hunt—Authenticity in 3D.docx
- Tinkercad Scavenger Hunt—Authenticity in 3D.pdf

Materials

- Presentation Slides (attached)
- Laptop / Tablet with access to the Tinkercad website
- Authenticity Framework (attached; 1 per participant)
- Authenticity Learning and Teaching Chart (attached; 1 per participant)
- Follow the Green, Not the Dream Lesson (attached; 1 per participant)
- Jigsaw handout (attached; 1 per participant)
- Tinkercad Scavenger Hunt handout (attached; 1 per participant)
- Sticky notes
- Pens or pencils
- 3D printed model examples

15 minutes

Engage

Teacher's Note

Prior to the session collect several examples of 3D prints that are either used for authentic learning or were printed for entertainment. Have at least two examples per table for participants to observe and reflect on.

As participants enter, have **slide 2** displayed and encourage them to create a Tinkercad educator account that they will use later in the session.

Use **slides 3-5** to make introductions and share session essential questions and objectives.

Move to **slide 6**. Ask participants to look at the examples of 3D prints on their tables. Ask participants: "*Which prints do you think enhance instruction? Why?*" Have participants record their ideas on sticky notes. Take note of any misconceptions and plan to address them later in the session.

20 minutes

Explore

Display **slide 7** and hand out copies of the **Authenticity Framework**, **Authenticity Learning and Teaching Chart**, **Follow the Green, Not the Dream Lesson**, and **Jigsaw Handout** note catcher. Review the components of authenticity and then move to **slide 8** to introduce the Jigsaw activity. Explain that each group will read a different part of the lesson to look for evidence of authenticity. Assign groups the following sections:

- Engage and Evaluate
- Explore 1 and Explain 1
- Explore 2 and Explain 2
- Extend

Display **slide 9** to give groups time to read, record, and reflect on what they noticed in the lesson. Call on each small group to share out with the larger group what they noticed.

10 minutes

Explain

Display **slide 10**. Take this opportunity to share out other examples you have of authentically integrating 3D printing into the curriculum. Call on participants to share any examples they have as well.

Sample Responses

Materials for a pollinator garden, monuments for civil rights heroes, Mars rovers, etc.

30 minutes

Extend

Display **slide 11**. Provide a printed or digital copy of the **Tinkercad Scavenger Hunt** handout and instruct participants to follow the QR code or link (http://k20.ou.edu/3d-tinkercad). Instruct participants to complete all of the direct starters and mark their progress in the scavenger hunt document. Once participants have completed the starters, instruct them to answer the reflection questions at the bottom of the scavenger hunt document.

Display **slide 12**. Ask participants to share out based on the reflection prompts in the presentation:

- *What was the easiest thing you did? The most challenging?*
- *What application of curriculum standards do you see?*

10 minutes

Evaluate

Once participants have had time to explore Tinkercad, lead a group discussion of what worked well and what they found challenging. What applications to curriculum standards did they see?

Ask: "*What makes a 3D print assignment authentic learning?*"

Research Rationale

Science engagement and literacy has seen promising positive impacts from the use of kits, such as 3D printing kits, being integrated into the curriculum. Providing hands-on approaches for students to learn material in science classes leads to more meaningful learning, better information retention, and increased engagement. By supplementing science curricula with kits, teachers can promote active participation in lessons, facilitate positive classroom environments, and make real-world connections.

Resources

- K20 Center. (n.d.). Follow the Green, not the Dream. Lessons. https://learn.k20center.ou.edu/lesson/1763
- K20 Center. (n.d.). Jigsaw. Strategies. https://learn.k20center.ou.edu/strategy/179
- Dickerson, D., Clark, M., Dawkins, K., & Horne, C. (2006). Using science kits to construct content understandings in elementary schools. *Journal of Elementary Science Education*, 18(1), 43-56.
- Foley, J. M., Bruno, B. C., Tolman, R. T., Kagami, R. S., Hsia, M. H., Mayer, B., & Inazu, J. K. (2013). C-MORE science kits as a classroom learning tool. *Journal of Geoscience Education*, 61(3), 256-267.
- Stohr-Hunt, P. M. (1996). An analysis of frequency of hands-on experience and science achievement. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching*, 33(1), 101-109.
- Young, B. J., & Lee, S. K. (2005). The effects of a kit-based science curriculum and intensive science professional development on elementary student science achievement. *Journal of Science Education and Technology*, 14(5-6), 471-481.