

Core Skills Analysis

Science

- The student developed a deeper understanding of material science by selecting appropriate filament types for their 3D printing projects, exploring properties like flexibility, strength, and heat resistance.
- Hands-on experience in 3D printing introduced the student to basic engineering principles, including design iterations and prototyping, which reinforced the scientific method of hypothesis, experimentation, and analysis.
- The project required the student to research and understand the environmental impacts of various materials, promoting awareness of sustainable practices in technology and science.
- By troubleshooting technical issues during the printing process, the student enhanced problem-solving skills and gained insights into thermodynamic principles, such as heat transfer and cooling rates.

Tips

To further enhance the student's learning experience, it is recommended that they delve into the science of the materials used in 3D printing, exploring polymers and their molecular structures. This could be augmented by inviting a guest speaker, such as a materials scientist, for a Q&A session. The student could also engage in group projects that involve designing and printing useful prototypes for community needs, promoting collaboration and real-world application. Additional activities could include experimenting with different print settings or concepts from engineering design challenges that would encourage creativity and critical thinking.

Book Recommendations

- [3D Printing: How to Print Anything](#) by Christopher Barnatt: An informative book that introduces readers to the world of 3D printing basics, its applications, and implications across various fields.
- [The New 3D Printing Handbook](#) by Thomas J. Weller: This guide offers insights into 3D printing technologies and methods, emphasizing practical applications along with project ideas suitable for teens.
- [3D Printing with Tinkercad](#) by Gordon Fisher: A beginner-friendly book that teaches 3D modeling using Tinkercad, with step-by-step projects tailored for young creators.

Learning Standards

- NGSS HS-ETS1-2: Analyze a major global challenge to determine how engineering can contribute to solutions.
- NGSS HS-PS1-3: Plan and conduct an investigation to gather evidence to compare the structure of substances.
- CCSS.ELA-LITERACY.WHST.11-12.7: Conduct short research projects to answer a question, drawing on several sources.