

Practical Technology Applications in STEM Education

Technology is an integral component of Science, Technology, Engineering, and Mathematics (STEM) learning. Students may use and apply various technology skills, tools, and resources to conduct research, design projects, implement investigations or processes, and communicate results or information.

This document provides an overview of practical technology concepts, processes, skills, and tools that may apply as students participate in scientific investigations or engineering design tasks.

What is Practical Technology?

Practical technology teaches students how to use technological concepts, processes, skills, and tools that can be readily integrated into the classroom setting. It involves using a range of technical resources from basic tools to advanced digital platforms, while emphasizing the real-world relevance of technology by focusing on how it is used in everyday scenarios, industries, and problem-solving contexts.

Practical technology goes beyond theoretical knowledge and encourages students to engage with tools and skills directly applicable to various fields, fostering their ability to adapt and thrive in an increasingly tech-driven world. By embracing practical technology, students improve technological literacy, critical thinking, and innovation skills, which are essential for their academic and career goals.

Technological Processes, Skills, and Tools

During STEM activities, students engage with and leverage technology systems, concepts, and operations.

Technology Systems

Students use operating systems, learning management systems, virtual systems, and network systems (e.g., internet, intranet, wireless network, short-range wireless technology) to navigate digital landscapes, collaborate on projects in real or virtual settings, access and analyze information from diverse sources, communicate effectively across distances, and develop a foundational understanding of cybersecurity practices that safeguard their digital interactions and data.

Software Application Functions

Students perform various technology functions such as formatting, editing, file management, keyboarding techniques, and data storage.

- **Formatting:** page layout and margins, outline options, bulleting, and numbered lists
- **Editing:** finding and replacing, inserting, or deleting text
- **File management:** creating file types for text, graphics, and multimedia files, organizing digital files using appropriate naming conventions and folder structures, file conversion, tagging, and using emerging digital organizational strategies
- **Keyboarding techniques:** using keyboard keys or other input device shortcuts for actions such as copying, pasting, undoing, or closing windows
- **Data storage:** selecting the appropriate type of storage to share data

Troubleshooting

Students solve minor technical problems with hardware and software, such as restarting or rebooting it. They also troubleshoot issues within the coding they have created, and research and test potential solutions to solve problems related to hardware, software, and programming.

Function and Purpose

Students evaluate and select appropriate methods or techniques for scientific inquiry or engineering design activities relevant to the question or engineering problem. Students identify, select, and use various technology applications, devices, and online learning environments to write, discuss, create, and share ideas on content. They gather and analyze data, collaborate, communicate with others, and potentially perform other tasks related to scientific inquiry or engineering design activities.

Productivity Tools

- **Time management:** applications for timeline scheduling, time tracking, distraction reduction, task checklists, and reminders
- **Documentation:** applications for notetaking, word processing, spreadsheet data organization, graphic organizers, video or audio recording, and grammar checkers
- **Organization:** local and remote file and data storage (e.g., local server, cloud architecture)
- **Sharing and communication:** applications for communicating (e.g., email, virtual meetings, social media), collaborating and sharing information (e.g., shared documents, virtual workspaces, social media), presenting, publishing, and marketing
- **Digital security:** applications for password management, and the use of antivirus software, firewalls, multi-factor authentication, and digital privacy settings

Research Tools

- **Information search and collecting:** applications for web searching, database accessing, library browsing, article or literature reading, social media (blogs, vlogs, and networks), and virtual meeting
- **Documentation:** applications for creating texts, checking plagiarism and grammar, recording and transcribing video and audio
- **Reference management:** information resources and citations organization

Design and Creation Tools

- **Ideation:** graphic organizers, drawing apps, digital whiteboards, etc.
- **Digital illustration, modeling, or prototyping:** digital drawing apps, computer-aided design and drafting (CAD), 3-D printing, augmented reality (AR), virtual reality (VR), etc.
- **Presentation tools:** using text, images, video, audio, or other digital media

Data Tools

- **Testing and data gathering:** digital instruments
- **Data analysis:** digital probe ware–pH, motion, temperature, oxygen, sound, and light, experiment software, and spreadsheet software (data tables, graphs, and charts)
- **Data visualization:** interactive charts, geographic maps, infographics, maps, Geographic information system (GIS) mapping, graphs, and reports

This toolkit was created for Lone Star STEM, a partnership between TEA, Jobs for the Future, and the University of Texas at Austin that is funded by the U.S. Department of Education.